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THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

Founded, 1833. Incorporated by Royal Charter, 1885.

PATRON—HIS MAJESTY THE KING.

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TRANSACTIONS AND PROCEEDINGS OF THE SOCIETY.

Some of the early volumes of the Society's Transactions are out of print. Any single volume of the years 1868–1887, is sold at 10*s.* to Fellows. The volumes for 1868–1900, in sets of not less than five, as well as the five of the Third Series (1862–1867), can be obtained by Fellows at greatly reduced prices on application to the Secretary. The following is a price list of recently published parts—

1934.—Transactions, Vol. LXXXII: Part I, £1 10*s.* 0*d.*, to Fellows, £1 2*s.* 6*d.*; Part II, £2 8*s.* 0*d.*, to Fellows, £1 16*s.* 0d.
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Proceedings, Vol. X: Part I, 10*s.* 6*d.*, to Fellows, 7*s.* 9*d.*

STYLOPS.

1932–4.—Vols. 1–3, £1 16*s.* 0*d.*; to Fellows, £1 7*s.* 0*d.*

1935.—Vol. 4, subscription rate £1 4*s.* 0*d.*, to Fellows, 16*s.* 0*d.*; monthly parts 3*s.* 0*d.* each, to Fellows, 2*s.* 0*d.*

THE PROCEEDINGS

OF THE

ROYAL

ENTOMOLOGICAL SOCIETY

OF LONDON

VOL. X. 1935.

Wednesday, February 6th, 1935.

Dr. S. A. NEAVE, O.B.E., President, in the Chair.

Vice-Presidents.

The PRESIDENT announced that he had nominated Mr. C. L. COLLENETTE, Dr. H. ELTRINGHAM, F.R.S., and Dr. A. D. IMMS, F.R.S., as Vice-Presidents for the year.

Elections.

The following were elected Fellows of the Society:—JOHN CHRISTOPHER BEADNELL CRASKE, 57, Cornwall Gardens, S.W. 7; JOHN HUGH GRAHAM GRIEVE, B.Sc., Public Health Service (Entomologist), Durban, South Africa; LEONARD PARMENTER, 94, Fairlands Avenue, Thornton Heath, Surrey.

Obituary.

The PRESIDENT announced the death of Dr. F. A. DIXEY, F.R.S., elected in 1887, a former President of the Society. A vote of condolence with the relatives of Dr. Dixey was passed on the proposal of the President.

The death of Mr. W. G. CLUTTEN, elected a Fellow of the Society in 1922, was also recorded.

The SECRETARY made the following announcement:—

The Council of the British Association has recently made arrangements with the Ministry of Health by means of which the Association is informed of schemes in progress for town and country planning.

The Association is anxious that it should receive information regarding any site of scientific interest which it is desirable should be included in a town or country planning scheme, or for which valid reasons could be advanced for its being scheduled as a nature sanctuary.

Fellows of the Society are therefore invited to inform the Secretary of any districts which they consider should be included under either of the above headings.

Exhibits.

The following communications were made to the meeting :—

Dr. S. A. Neave, O.B.E., President, exhibited some British insects collected, and, in some cases, bred by Herbert Spencer as a boy. These had been presented to the Society for preservation by the Trustees of Herbert Spencer.

Three Documents relating to the early history of the Society. By Professor Hale Carpenter.

Among some papers in the Hope Department of the Oxford Museum, formerly under the charge of J. O. Westwood, who played such a large part in the early days of the Society, I found one which the Registrar assured me does not exist in the archives.

The Centenary History of the Society contains an extract from the minute book which records that "at a meeting of gentlemen, friends of the science of Entomology, held at the British Museum, May 3rd, 1833," it was "Resolved, that a Society be established for the promotion of the science of Entomology in its various branches, to be called the Entomological Society of London." A committee was appointed with G. R. Gray as secretary.

The document now in question is dated May 13th, 1833, from 22, East Street, Red Lion Square, signed by George Robert Gray, and addressed to "W. Burchell Esq^{re} Fulham." It runs as follows : "Sir, I am requested to forward you the accompanying Copy of Resolutions agreed upon at a preliminary Meeting held for the purpose of establishing an Entomological Society and also to express a hope that you will, on or before Wednesday May 22nd, which is fixed for the first General Meeting, authorize me to add your name as an Original Member."

Appended to the letter is a copy of the Resolutions dealing with the establishment and name of the Society, appointment of a Committee of seven (the names are those on p. 7 of the History), holding of periodical meetings, formation of collections and library, publication of communications, enrolment of Original Members and subsequent election of others by ballot; and fixing the annual subscription at one guinea, the admission fee for Original Members at one guinea and for Elected Members at Two Guineas. The first general meeting on May 22nd took place at the "Thatched House," St. James's Street.

It does not appear that Burchell became a member, for his name does not occur in subsequent lists of members.

The second document is not mentioned in the Centenary History. It is headed simply "Entomological Society of London," and has no date, but the year 1833 is pencilled on it. It is a letter signed by "G. R. Gray, Secretary," and runs as follows : "Sir, It having been ascertained that through a purely accidental omission, several Entomologists did not receive a Copy of the Circular inviting their attendance at a meeting to be held at the Thatched House, St. James's Street, on the 22nd day of May last, I beg to inform you that the second general meeting of the Entomological Society will be held at the Society's Room, 17, Old Bond Street, on Monday the 4th of November at 8 P.M. precisely, at which your company and that of any of your friends who may be attached to Entomology is solicited. By order of the Council."

The third document is a prospectus of the Society, not dated, but probably a result of the November meeting and before the commencement of 1834. It gives the Council and officers as stated on p. 9 of the History, with the additional name of W. B. Spence as Foreign Secretary (p. 10). It stated that the number of British and Foreign Ordinary members shall be unlimited, Foreign Honorary members not to exceed ten. The Council shall consist of thirteen members, four of whom shall not be eligible for the following year. The officers shall consist of a President; three Vice-Presidents; a Treasurer, who may be a Vice-President; a Secretary; a Foreign Secretary, and a Curator. On the back of the sheet is a list of eighty-five ordinary members, of whom Charles Darwin is one, one Honorary member (W. Spence, F.L.S.) and the seven Honorary Foreign members named on pp. 9–10 of the History.

The food-plant of the African Nymphaline butterfly *Cymothoe coenis* Drury.

By Prof. Edward B. Poulton.

My friend Dr. C. B. Williams has kindly informed me that Mons. Glesquière, in the Belgian Congo, has found the food-plant of *C. coenis* to be *Caloncoba welwitschii* although it occurs accidentally at times on *Piptadenia africana* (Leguminosae). *Caloncoba* belongs to the Flacourtiaceae, allied to the Violaceae and the Passifloraceae. The food-plants of this abundant species are of special importance for the study of its strongly marked migrations, and I therefore applied to my friends of the Kew Herbarium who have supplied the following notes:—

"*Caloncoba welwitschii* (Oliv.) Gilg. is described by Dr. Welwitsch as an elegant bush with erect branches. *Piptadenia africana* Hook. f. ex Benth. is described by Dr. Welwitsch as 'a tree 20–30 ft. high, patently and sparingly branched,' whilst Irvine, in his 'Plants of the Gold Coast,' describes it as 'a tall tree, very striking with its flat tiers of branches,' and states that it is in flower throughout most of the year."

It will be remembered that Miss Vinall * found the larvae at Bongandanga, Basankusu, Belgian Congo, on the leaves of "Bosaaki," which she described as "more of a shrub than a tree." The leaves were considered by the authorities at Kew probably to belong to a species of *Thespesia* (Malvaceae). Mons. Glesquière states that the commonest form of *C. coenis* in the Eala district is *conformis* Auriv., also recorded as "very plentiful here at times," by Miss Vinall.†

Inquiline larvae, probably Lepidopterous, in Termitaria; methods of a Termite-raiding ant, probably *Megaponera foetens* F.: Nyasaland.

By Dr. W. A. Lamborn, O.B.E.

[Communicated by Prof. E. B. Poulton, who said that his friend's notes, together with the following, were dated 10 Jan. 1935, and had been sent by air-mail from Fort Johnston.]

I have lately been interested in an amazing inquiline found in termitaria, which must, I think, be a Lepidopterous larva, that of one of the smaller moths.

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* 1930, *Proc. R. ent. Soc. Lond.*, 5 : 93.

† 1928, *Ibid.*, 3 : 88. See also 88–91 for the other forms obtained by Miss Vinall and for those collected in Uganda by Prof. Hale Carpenter and Capt. C. R. S. Pitman.

Some five or six years ago I found a large number crawling about among termites in a rotting stump which I split open. I had no lens with me at the time, and when I returned found that the stump had been removed by natives as fuel. I determined recently to make further investigation, and having examined eight or ten termitaria, have obtained three of the larvae. My first impression was that they must be Coleopterous, and that indeed was the reason why I did not trouble about them for so long, but with a lens I see that they have all the features characteristic of the larvae of Lepidoptera, although they have very anomalous characters in the form of a row of seven small flask-shaped tubercles on each side, a pair to a segment. The larvae are light chestnut in colour, exactly the same tint as the termites, and the tubercles are the same except at the apex which is lighter. The larvae rush about with considerable activity in and out of the holes in the termitarium, and as they move are greeted apparently by the termites which make a convulsive movement with their heads, and when they stop, a termite frequently runs up, and applies its mouth-parts to one or other of the tubercles, as if obtaining a " bonne bouche." I have not been able to see the aperture of any duct at the apex, but there may be small cutaneous glands providing secretion, I suppose. Is not that amazing ? I have satisfied myself by examination of the intestinal contents of one of these larvae that happened to be crushed, and by carefully watching others, that they feed on the termite fungus, and so I have some hopes of being able to breed them out, when I will try to write a better account than this which is a very hurried one.

Arising from this work I made an observation of some interest on the habits of a large Ponerine ant in regard to its prey. When the stumps are split open the termites seek cover with the utmost despatch, but the Ponerines, which so frequently make their nests near termitaria, rush after them, sting them one by one, and then just drop them, collecting and carrying off the victims, six or seven in their mouths, when the more fortunate termites have all found cover. One might almost imagine from this that the Ponerines have reasoning power. Farquharson may have made this observation, but if so I have forgotten it.*

Further striking evidence of the distastefulness which accompanies the aposematic display of the African Acridian *Zonocerus elegans* Thun. By Dr. W. A. Lamborn.

[Communicated by Prof. Poulton.]

I have made another little observation as to the real value of warning coloration in the case of an Acridian, *Zonocerus elegans*, an immature form, bright yellow with slate blue and some red about it. My kitten seized one in its mouth, but dropped it instantly, and commenced to salivate. Strings of thick mucus an inch long appeared at the corner of its mouth with much frothy saliva, and the animal retched but did not actually vomit. It kept on rubbing its mouth against a tree in an endeavour to get rid of the cause, and was not its usual self for two or three hours. The Acridian had hopped off, apparently little the worse for its experience. I expect that you will remember these grasshoppers, for they display themselves in enormous numbers in open spaces all over Africa at certain seasons.

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* The description of the Termite-raiding *Megaponera* in our *Proceedings*, **1915** : v–ix, by Prof. Hale Carpenter, C. O. Farquharson, Dr. S. A. Neave, and Capt. C. H. Stigand; also by Prof. Carpenter in *Ibid.*, **1916** : cxxix, does not mention the method recorded by Dr. Lamborn. Prof. Carpenter's later notes (1929, *Ibid.*, **4** : 79, 80) do, however, contain a careful account of the ant stinging and carrying off bundles of its prey.—E.B.P.

Further notes on *Laternaria*. By Dr. J. G. MYERS.

[Communicated by Prof. E. B. Poulton, who said that the notes, continuing those recorded in 1934, *Proc. R. ent. Soc. Lond.*, **9** : 83, 84, had been written, 3 Jan. 1935, from the Imperial College of Tropical Agriculture, Trinidad.]

In a paper just received from Señor Oscar Monte, through Mr. Box, there are some three pages on *Laternaria*, and I see that neither he, nor another author whom he quotes, agree with Martius as to the spelling and derivation of the Tupi-Guarani name of the insect. Martius, however, was speaking at first hand, and was, moreover, a most able student of Indian languages, whereas probably both Monte and Sampaio are quoting at second- or third-hand. Herewith are Monte's remarks which I have translated very literally :

Monte, O. 1932, As cigarrinhas sugadoras. *Bol. agric. Zootec. Vet. Minas Geraes*, **9** : 27 pp., 20 figs.
p. 20 [translation].

Distinguished in this family by its strange appearance is the famous and even calumniated JEQUITIRANABOIA, also called COBRA DO AR [air snake] or COBRA DE ASA (winged snake) or else GITIRANABOIA, which in our Tupi Indian means *yakirana* (cicada) and *mboya* (snake), that is, cicada-snake or cicada with a head like a snake or, as one reads in T. Sampaio, *Yakirana* (something like a louse) or that is, a cicada whose body resembles, to the Indian, a large louse (*Cicada*).

Monte further mentions a reference by Le Cointe (*La Nature*, 1905), which I cannot refer to in Trinidad, describing the song of *Laternaria* and the ceremonial precautions taken by the Amazon Indians to avoid the "*dardo homicida*" with which its thorax is armed.

Notes on a special method of making butterfly pictures. By L. G. O. WOODHOUSE.

Collectors in foreign countries are often handicapped by the lack of good illustrations of butterflies, obtainable at reasonable cost, by which to identify their collections.

The method of simultaneously transferring the scales from both sides of butterfly wings on to gummed or waxed paper, has been known for many years, and I found it a most useful and handy method for making good and accurate pictures for ready reference, provided the butterfly is not a rare one, and a duplicate can be spared from the collection.

The following is a brief outline of the method I have adopted :—

A piece of good white paper is folded in half and then gummed or waxed; having carefully cut off the fore- and hind-wings from the same side of the butterfly, place them on the gummed or waxed paper; fold it over, and then place it on a very hard, smooth surface—such as a piece of flat glass or china. Each side of the folded paper is then very firmly, but evenly, pressed with a very hard tool—such as a wooden roller. If gum is used the pressure will have to be applied quickly, before the gum has dried. The folded paper is then carefully peeled apart, and the wings, now wholly or partly denuded of scales, carefully removed. Although surprisingly good results can be achieved, it is evident that the scales have been reversed, with the result that the pictures are very disappointing with such families as the Lycaenids and Papilios.

With the help and advice of my friends, Mr. J. V. Collins, M.A., Sc.M., F.I.C., the Ceylon Government Analyst, and Mr. G. M. R. Henry, of the Colombo Museum, the following method has been evolved :—

The scales are first pressed off on to waxed paper, which is then carefully stuck on to a piece of gummed paper, and left to dry completely, after which both papers, closely adhering to each other, are immersed in a bath of petrol (which dissolves the wax but which does not affect the gum).

I am calling the single process the "Gum" method and the double one the "Wax-cum-Gum" method and have described each in detail below.

DESCRIPTION OF THE "GUM" METHOD.

Tools required.

Forceps for handling the butterflies and their cut-off wings. A sharp-pointed pair of small scissors for cutting the wings off the bodies. A finger-bowl with which to cover the cut-off wings, in order to prevent their being blown away. A good brand of white paper. Some large pieces of gum arabic, dissolved in water and carefully strained so as to be as thick, but clean and transparent, as possible. A couple of stiff-haired brushes for covering the paper as quickly, evenly and thinly as possible. A hard surface, such as plate glass, on which to press off. Some hard article—a bone tooth-brush handle—with which to press off. A good sharp knife.

The "Gum" Process.

(i) Very carefully cut off one side (fore- and hind-wings) of the butterfly, as close to the body as possible, and place the two wings under a finger-bowl. (ii) Cut off a rectangular piece of the white paper, sufficiently large to cover the *whole* butterfly had it been properly set. (iii) Carefully fold the paper in half and open it out again for gumming. (iv) Correctly gumming the paper is most important and makes or mars the picture. The gum must be applied with a brush as lightly and evenly as possible; if it is uneven, or too thick, the scales will coalesce and the picture will be hopelessly blurred; if there are patches with little or no gum the scales will not adhere to the paper. (v) With the forceps place the wings in position on half the gummed paper, and fold the other gummed half over them. (vi) As firmly and evenly as possible, press on the folded paper with the hard article on the hard surface, turning the folded paper over so that both sides are evenly pressed and the scales come off from both sides of the wings. (vii) Carefully peel the folded paper apart when the now diaphanous wings, both sides of which have been wholly or partly denuded of scales, can be picked off with the forceps. *Note:* The application of the gum to the paper and the subsequent operations (v), (vi) and (vii) should all be done as quickly as possible before the gum has dried. (viii) When the gum is dry, the transfer can be carefully cut out and pasted on to a suitable mount—white or coloured—and correctly spaced so that the body and antennae may be drawn in against the upperside. The name of the butterfly, locality and date of capture must, of course, be carefully recorded on the mount, which I protect with a piece of tracing paper.

The following are a few remarks on the "Gum" method.

It will be evident that when this process has been completed, the scales in the transfer pictures have been reversed, but this does not seem to matter for some families—Nymphalids, Pierids, Hesperids, etc., in which the scales are presumably the same colour and texture on both sides. In the majority of cases these transfer pictures are more accurate and reliable—both for colour and detail—than ordinary coloured reproductions. But in the case of the Lycaenids and some Papilios, etc., the colours are incorrect. In some species, *e.g.* the Charaxes, reversing the scales brings to light wonderfully delicate sheens of beautiful and varying hues which are certainly not perceptible in the real butterfly wing. In other butterflies—the Danaids, the Pierid—*Pareronia valeria ceylonica*—and certain of the Papilios—*alcibiades, nomius, doson, teredon, agamemnon*—some of the coloured scales are replaced by a pigment in the membrane of the wings, so that the colour transfer of that part of the wing is not possible. Two pictures can be made from each complete butterfly; or if one side is damaged, instead of discarding the insect one good picture can be made from the undamaged side. In some cases, *e.g.* yellow Pierids, the chemical action of the gum gradually makes the colours dingy and dull. This might be counteracted by mixing the gum with an equal quantity of a saturated solution of aluminium sulphate. I have found that the best results are obtained from fresh specimens, *i.e.* if the transfer is made within 24 hours of capture; but quite good transfer pictures can be got from old specimens, which, however, must be carefully "relaxed."

To sum up, the "Gum" method at its best, produces pictures which are not only very accurate in outline and detail, but the colours are correct in depth and tone; and at its worst, produces an accurate outline of form and detail. Between 1924 and 1929 I made "Gum" pictures of almost every one of the 233 known Ceylon butterflies, which I found most useful in England in 1929 when I arranged my Collection, which I had sent home ahead to be set and kept for me.

Very striking and beautiful results can be obtained by using waxed, instead of gummed, paper, but the wax transfers are not so easy to mount, and being much more fragile and liable to melt in heat, are more difficult to keep intact.

DESCRIPTION OF THE "WAX-CUM-GUM" METHOD.

Tools required.

In addition to the items mentioned above, the following are required—

A device for exerting very considerable pressure—I use an old, iron, copying letter-press.

Good waxed paper, which I have had great difficulty in procuring. Various kinds of white and coloured papers—thick and thin. Blotting-paper.

The "Wax-cum-Gum" Process.

(i) Very carefully cut off one side (fore- and hind-wings) of the butterfly, as close to the body as possible, and place the two wings under a finger-bowl. (ii) Cut out a piece of rectangular waxed paper, sufficiently large to cover the whole butterfly had it been properly set. (iii) Carefully fold piece of paper in half and open it out again. (iv) Place the paper in position on a larger piece of blotting-paper, which will subsequently be folded over. (v) Place the wings carefully in position on half the waxed paper; fold the other waxed half over, and enclose the waxed paper in the blotting-paper. (vi) Then very carefully insert the whole in the iron, letter-copying press and apply as much pressure as is possible. The blotting-pad should then be carefully extracted and the tooth-brush handle or wooden roller used for both sides on the hard surface, and a final pressure by the copying press applied. (vii) Peel the folded waxed paper apart, when the now diaphanous wings, both sides of which have been wholly or partly denuded of scales, can be picked off with the forceps. (viii) Each waxed transfer is then carefully stuck on to a piece of paper, on to which a liberal but even application of dissolved gum arabic has just been made; very little pressure is necessary—just sufficient, with the fingers, to press out any air bubbles; the gum must be allowed plenty of time to dry (I always leave it for 24 hours at least) in between the blotting-paper, which I insert in an old magazine with sufficient weight to keep the gum and waxed paper quite flat. (ix) When convenient, but never less than 24 hours after stage (viii), the waxed paper can be separated from the gummed paper by immersion in a bath of petrol, which dissolves the wax but does not affect the gum. (x) Before putting the gummed paper to dry, immerse it in a fresh petrol bath in order to wash all wax away. (xi) When the petrol has completely evaporated from the gummed paper the transfer may be carefully cut out and pasted on to a suitable mount and correctly spaced so that the body and antennae can be drawn in against the upperside. The name of the butterfly, locality and date of capture must, of course, be carefully recorded on the mount, which I protect with a piece of tracing paper.

The following are a few remarks on the " Wax-cum-Gum " method.

In some of the more brilliant and varying-hued butterflies the wing-scales may be compared to minute reflecting, but uncoloured, lenses or prisms which must be the right way up to reflect and refract the light rays. Consequently, the single " Gum " process is a failure, whereas the double " Wax-cum-Gum " one produces a transfer picture which surpasses any other of which I am aware. By varying the colour or thickness of the paper on which the gum is applied (viii) great improvements can be effected. For instance, if thick dark brown paper is used for the uppersides of *Papilio crino*, and *Lampides bochus*, *Tajuria longinus*, etc., the resultant transfer picture can be very favourably compared with the actual wing. I use grey or brown-tinted, thin paper for *Spindasis*, and before pasting the gummed paper on to the mount, I colour, on the reverse side, the black-tipped wings, which enhances the velvety look. To get the best effect for *Hestia jasonia* I use the best Air-mail white paper and pick out the spots in black, on the reverse side of the gummed paper, before pasting on its mount. Similarly for such Pierids as *Delias eucharis* and its well-known mimic *Prioneris sita*, I use very thin white paper and colour the red marginal spots on the reverse side of the under wing which show through pink just as they appear on the actual wing.

By using very thin paper the difficulty referred to in (ii) above can be overcome by colouring on the reverse side.

In the "Wax-cum-Gum" method the butterflies must be completely dry, or the juices will spoil the wax transfers. I have obtained perfect results from specimens taken 18 years ago, and which the collector was going to throw away; it is of considerable advantage to be able to wait and utilise old specimens from a collection which has been replenished by fresh ones. I see no reason why butterflies captured 50 years ago should not make good pictures provided the insects are well preserved and in good condition.

The pictures take up little room and are available for ready reference. I have found them excellent for lecture purposes and they seem unaffected by the heat of an epidiascope.

I would emphasise that I do not wish to imply that butterfly pictures made in the "Wax-cum-Gum" method can take the place of any well-set, perfect insect. But for amateur lepidopterists, who have to spend most of their working lives in a tropical climate, it is heartbreaking to see beautiful specimens being ruined by mould and mites, and if chemicals are used as a deterrent in store boxes the insects quickly lose their colour and sheen.

I keep the rubbed-off wings, bodies and all the "spare parts" labelled and indexed to my pictures and I venture to think that this somewhat unique collection may be of some practical help to the "cabinet" naturalist, to which I humbly aspire when my official work in Ceylon is done and I retire home to England.

In conclusion, I realise only too well that the "Wax-cum-Gum" process is not by any means perfect and I hope that anyone interested will work in conjunction with me and exchange ideas for our mutual benefit.

Biology of Indian mosquito larvae that attach themselves to roots of water plants.

By M. O. T. Iyengar (a visitor).

Larvae and pupae of several species of mosquitoes do not come to the surface of water to obtain their supply of oxygen; they get it by tapping the air cavities in the roots of aquatic plants. In India, three species of *Mansonioides* (*M. annulifera* Theo., *M. uniformis* Theo. and *M. indiana* Edw.) and one of *Ficalbia* (*F. hybrida* Leic.) have been observed with this habit. The plant utilised by these mosquitoes is *Pistia stratiotes*.

For this interesting method of obtaining oxygen from the roots, the breathing apparatus of the larva and the pupa is modified to pierce the root tissue. In the larva of *Mansonioides*, the siphon is provided with spines at the apex and with a saw-like structure. This is worked by a long chitinous rod which is moved up and down by a set of muscles and by this means the larva is able to pierce the root. After that is done, the hooks at the apex of the siphon are made to protrude, thereby anchoring the larva to the root.

The mechanism in the siphon of *Ficalbia hybrida* is very similar, except that the siphon is less specialised and the saw-like structure is absent. The mechanism of penetration of the root and of anchoring the larva is like that observed in the larva of *Mansonioides*. To release its hold on the root, the larva withdraws the hooks.

The pupae also attack the root for oxygen, and their breathing tubes are adapted for piercing the root tissue. In *Mansonioides*, the apex of the tube is produced into a chitinous, lancet-shaped structure, on either side of which are flat transparent wing-like flaps which have minute curved hairs; these and a large hook near the tip of the tube serve to fasten the pupa to the root. The breathing tubes of the pupa of *Ficalbia hybrida* are similar though less specialised. In this species the apex of the tube is divided into two parts, one of which is furnished with a chitinised spike in the middle and the other of which is thin and transparent. In both of these are minute curved hairs which serve to retain the respiratory trumpet in its position in the root.

It is interesting to observe how a larva attaches itself to the roots of the water-plant. The larva moves backwards with its siphon pointing horizontally and thrusts the tip of the siphon into the root. Once the siphon comes in contact with the root, the larva wriggles backwards and by working the chitinous rod controlling the hooks, it penetrates the root deep enough for the siphon to enter the air cavity. The pupa, on the other hand, moves forwards in a horizontal plane with its two breathing tubes kept together.

In India, these mosquitoes use only one species of water plant, *Pistia stratiotes*, to obtain their supply of oxygen. Not all water plants are suitable for this purpose. To be suitable a plant must fulfil several conditions: the root or stem should hang in the water; it should be soft enough to be pierced; there should be large longitudinal air cavities close to the periphery. *Pistia stratiotes* seems to fulfil these conditions best, which would explain why these mosquitoes prefer this plant to any other.

Pistia was invariably found in the breeding places of the four Indian species of mosquitoes mentioned above. I carried out some experiments in Travancore to determine whether *Mansonioides* larvae would survive in the absence of *Pistia*. Ponds with *Mansonioides* larvae were cleared of *Pistia* and all the larvae were put back into the pond. Although aquatic plants other than *Pistia* were allowed to remain in the water, it was found that in two days all the larvae of *Mansonioides* had disappeared. The larvae, being sluggish and heavier than water, seem to be ill fitted for free living and unable to protect themselves from their natural enemies.

Mansonioides is dependent on *Pistia* for another reason, since the three species studied in India would lay eggs only on *Pistia* plants. The method of oviposition is interesting as the mosquito thrusts its abdomen into the water and lays eggs on the submerged portions of the leaf of *Pistia*, in a manner described previously (Iyengar, 1933, *Ind. J. med. Res.*, **21** : 101). Mosquitoes enclosed in jars would not lay eggs in the absence of *Pistia*, but as soon as this plant was introduced they laid eggs on its leaves. This indicates that *Pistia* is essential for the oviposition of the eggs of *Mansonioides*.

The presence of *Pistia* is one determining factor for *Mansonioides* breeding; there is, however, another, and that is the presence of organic contamination. In the absence of the latter, a pond with *Pistia* may remain free from *Mansonioides*, but when organic matter is introduced *Mansonioides* may start breeding in the pond. The amount of organic contamination should not be too heavy.

In regard to the four species *M. annulifera*, *M. uniformis*, *M. indiana* and *F. hybrida*, the close association between these mosquitoes and *Pistia* is due to the fact that the larvae are dependent on *Pistia* for their oxygen and are incapable of a free life, at least in their early stages. And yet, another species of *Ficalbia*, *F. minima*, was always found to be associated with *Pistia* although the larvae and pupae of this species were free living and independent of *Pistia* for oxygen supply. *F. minima* was not observed to breed apart from *Pistia*, and this is explained by the recent observation made by me that *F. minima* lays its eggs on *Pistia* on the portions of the leaf overhanging the water surface. The eggs of *Ficalbia* were not known previously, and this observation is therefore of much interest. In this case, the close association between *F. minima* and *Pistia* is due to the fact that the mosquito would lay its eggs only on *Pistia*.

Phenological Records. By Maj. H. C. Gunton.

Since I last addressed this Society I have been fortunate enough to secure the assistance of Capt. Dannreuther, the Hon. Sec. of the Insect Immigration Committee of the S.E. Union of Scientific Societies and through him the collaboration of three other observers in S.E. England. It has therefore been possible to prepare new diagrams embodying a greater range of observations and recalculated averages. Particulars have also been plotted separately, and these have been placed at my disposal by an observer in N.W. England.

As a result of the increase in data in the S.E. district, which will be the district referred to unless otherwise stated, inconsistencies have already been much reduced and salient characteristics emphasised to an extent which is very encouraging but which points to the desirability of further co-operation.

Regarding the diagrams it will be convenient to refer to certain considerations which will facilitate the appreciation of their contents.

As regards the choice of a temperature measuring rod, the weekly basis is considered to be the most suitable. The use of the accumulated temperature curve has been dropped, for while it is, to some extent, interesting and instructive, it is inconvenient, if not useless, in connection with many of the changes between earliness and lateness of appearance of the insects with which we have to deal.

I give below an analysis of the diagrams prepared since these are not reproduced here. They are, however, available on application to me and some are being reproduced in a paper to be published by the Royal Meteorological Society shortly. A list of the species referred to will be found at p. 15. The names given for the Rhopalocera are those used in 1934, *Generic Names Brit. Ins. R. ent. Soc. Lond.*, and for the Heterocera those used in South, R., 1907, *Moths of Brit. Isles*.

S.E. 1922. Species 1–10.

Commencing with a state of earliness for Nos. 1–5 due to two warm spells, there followed a long cold period—9 weeks including only 2 weeks just above average, which caused a swing over from 8 days early for No. 5 due at 88th day to 31 days late for No. 6 due at 94th day. The other four insects observed, with due dates within this cold period, were also late by varying amounts up to 22 days.

S.E. 1923. Species 1–10.

A warm period of 11 weeks including only 1 week with slight deficit caused, with the exception of 3 species, marked earliness amounting to 8, 12, 41, 11, 17 and 28 days.

N.W. 1923. Species 1–10.

Generally similar temperature conditions to those in the last case gave corresponding and more consistent results, earliness being 4, 21, 12, 7, 11, 17, 25, 14 and 28 days with No. 10 missing early emergence as in the case of No. 9 and becoming slightly late. It is of interest to note that the due date of this insect was further ahead of the corresponding warm period than in S.E. 1923 when it emerged early. It also responded early in N.W. 1926.

N.W. 1924. Species 1–10.

Following the appearance of No. 1 at average date, the remainder were late by 17, 3, 7, 9, 7, 7, 16, 13 and 26 days as the result of a 13 weeks' cold period relieved by only 2 weeks with excess of 2 degrees.

S.E. 1925. Species 1–10.

Two groups of lateness corresponding to cold spells at due date, each followed by warm spells, the lateness being 14, 8 and 6 days in the first case and 13, 22 and 9 days in the second. This section also provides an example of a sudden change from 9 days early (No. 4) to 14 days late (No. 5) for insects due at days 82 and 88 respectively.

N.W. 1926. Species 1–10.

With one inconsistent exception two groups of earliness, the first of 7, 15, 19, 26 and 45 days and the second of 3, 29 and 35 days, corresponding to two markedly warm spells (4 weeks above 4 degrees excess and 2 weeks above 5 degrees excess respectively).

S.E. 1927. Species 21–41.

This case illustrates a gradual swing over from 14 days early (No. 21) to 12 days late (No. 39) as the result of 9 weeks' cold spell relieved by only 2 weeks with excess of less than 1 degree. The effect of these 2 weeks is, however, apparent in retarding the swing over.

S.E. 1931. Species 12–34.

This case illustrates a gradual swing over from 11 days late (No. 12) to 24 days early (No. 34) as the result of 4 weeks' warm spell with excess temperature throughout.

S.E. 1919. Species 1–42.

A degree of lateness of 19 days (No. 1) following a cold commencement to the year was changed to a slightly forward tendency at No. 3 by a mainly slightly warm period of 4 weeks. Lateness was restored to the immediate extent of 15 days at No. 4, due only two days later, and to varying extents for the following insects by two further cold spells. At the 123rd day a definitely warm spell set in, which, after 3 weeks, produced an early tendency which was neutralised and reversed, with two exceptions, to a marked degree of lateness by a further prolonged cold spell.

S.E. 1927. Species 33–50.

Three cold spells with two intermediate relatively warm spells of slight excess caused variations from 2 days early (No. 33) to 22 days late (No. 42). An example is presented of two species (Nos. 43 and 44) emerging at the end of the first warm spell after their due dates, while a third species (No. 42) waited through another cold spell to emerge at the beginning of the next warm spell. A later cold spell caused lateness of 34 days (No. 46) while Nos. 47, 48 and 49 were 21, 17 and 12 days late and No. 50 6 days early, all the last four species emerging when the temperature rose to within 1 degree (deficit) of the average after a deficit of nearly 5 degrees for one week followed by a deficit of over 2 degrees for another week.

S.E. 1934. Species 33–50.

In this case two long spells of marked excess temperature, separated by one week of deficit, maintained with two exceptions of slight lateness, degrees of earliness varying from 4 days to 20 days.

S.E. 1932. Complete Diagram 4.

A warm winter and an excess temperature of 8 degrees caused the emergence of No. 1 on the 23rd day—25 days early—but a long spell of mainly cold weather (5 weeks including 1 week of about 1 degree excess) caused plants and insects to become late up to 8–15 days until both were brought back to normal by a warm spell of 2 weeks—No. 6 (*P. rapae*) emerged 20 days early during a cold spell, but it will be seen that during this cold period there was a period of marked sunshine excess. The remainder of the season shows periods of considerable lateness brought back to normal or slight earliness by moderate warm spells until a long spell of warmth between days 220–260 caused the last few insects to be early. Second broods, with one exception, were late varying from 7 to 34 days.

S.E. 1933. Complete Diagram 5.

The diagram for this abnormal year speaks for itself—after a winter of about average temperature there followed a succession of periods of marked warmth including peaks of 5 degrees, 6 degrees and 7 degrees excess with only two short periods of deficit, the average excess temperature throughout the spring and summer being 2·7 degrees and the resulting earliness amounted in many cases to between 20 and 30 days. The earliness of second broods also reached 20–30 days in four cases.

N.W. 1933. Complete Diagram 8.

This diagram is, at the moment, rather difficult to understand. With temperatures throughout the winter, spring and summer practically the same as those for the S.E. district, the degree of earliness is very markedly less. It will be seen from the diagram and from the following table, however, that the rainfall and sunshine in the two districts differ materially, the sunshine in the N.W. being less but the drought more severe. In the absence of more than one set of observations for this district it does not seem possible to do more than bear these figures in mind in other analyses.

	Temperature.		Rainfall.		Sunshine.	
	Spring.	Summer.	Spring.	Summer.	Spring.	Summer.
S.E.	+2·6 deg.	+2·8 deg.	102%	70%	110%	120%
N.W.	+2·7 deg.	+2·7 deg.	86%	54%	88%	110%

S.E. 1934. Complete Diagram 6.

A cold winter with marked deficit extending to 98th day, causing lateness of plants and insects up to 15 days late, was followed by a succession of periods of marked warmth separated by single weeks only of deficit and resulting in a swing over through the average dates, both plant and insect, to a marked degree of forwardness for the remainder of the season, only less remarkable than that of 1933 (S.E.). The warm spells contained peaks of 4 degrees to 5 degrees excess and the corresponding earliness of insects showed many cases of the order of 10 to 20 days.

The earliness of second broods reached 20 to 30 days, emergences all taking place during the sustained period of excess temperature between the 180th and 213th days.

Conclusion. It will be seen that there is a large measure of consistency between the temperature fluctuations, using the weekly measuring rod, and the earliness and lateness of the insects. An attempt has been made to express the relationship in some simple form, but a study of the diagrams has led to the conclusion that this is impossible if it is not to be misleading in a large proportion of cases, for the following reasons. Except in instances where the persistence of a certain type of weather causes a gradual growth of forwardness or lateness or a gradual change over from one state to the other, it seems clear that early emergence depends on the occurrence of a warm period within a certain time distance in advance of the normal date for emergence. The same spell must result in different degrees of earliness according to that distance in advance, until a critical point is reached when the end of the warm period fails to induce emergence in the later insects. Late emergence, on the other hand, occurs when the normal date falls within a cold spell and is limited by the arrival of the next spell, sufficiently warm to induce emergence, and as the normal dates get later the ultimate lateness gets less. It has been seen that the response of the insects to sudden fluctuations may be very rapid, resulting in one being appreciably early while another, separated only by a few days in normal date, becomes appreciably late, and it also seems clear that the same influences which effect separation into earliness and lateness between adjacent insects, in the order of normal appearance, must also frequently interrupt the period of emergence of a single insect, and in such cases it is not necessary to regard the isolated or scarce early specimens as freaks.

If, then, we wish to be able to gauge the prospects of emergence in any ordinary, or extraordinary, season containing the fluctuations of temperature which are so usual, it appears that we must disregard to a large extent the average or accumulated temperatures of the season and concentrate on the close observance of the alternating warm and cold spells in relation to the normal dates of emergence which are being approached, bearing in mind the portion of the average weekly temperature curve which has been reached and the characteristics of the different species.

It is considered that the next stage of these investigations must include the adjustment of the lists of species to suit the local requirements of the different districts, the comparison of results obtained from different districts and the differences in the response of individual insects according to their life-histories and to the extent of their protection in the pupa state. To do this effectively there must be an increase in the number of observers.

It has been considered desirable to explain what has been done up to the present in order that assistance may, if possible, be obtained in time for the forthcoming season.

The following are the gentlemen who have kindly placed their own observations at the disposal of the author of these notes.

S.E. Dr. G. V. Bull, Brig.-Gen. B. H. Cooke, C.M.G., C.B.E., D.S.O., W. S. Gilles, F.I.C., F.C.S.; N.W. Dr. R. C. Lowther, M.B., Ch.B.

S.E. ENGLAND PHENOLOGICAL RECORDS, 1919–1934.

INDEX SHEET.

Species.

			First dates (average).	
1. *H. marginaria*	Dotted Border.	P.	Feb. 17	
1*a*.	Sallow (b).		Mar. 10	
2. *T. stabilis*	Common Quaker.	P.	,, 17	
3. *H. multistrigaria*	Mottled Grey.	P.	,, 21	
3*a*.	Wood Anemone (b).		,, 23	
4. *K. areola*	Early Grey.	P.	,, 23	
5. *A. badiata*	Shoulder Stripe.	P.	,, 29	
5*a*.	Larch (f).		,, 31	
6. *P. rapae*	Small White (B). D or M.	P.	Apr. 4	July 20
6*a*.	Blackthorn (b).		,, 4	
7. *S. bilunaria*	Early Thorn. D.	P.	,, 4	,, 24
7*a*.	Elm (f.)		,, 22	
8. *T. punctularia*	Grey Birch.	P.	,, 30	
9. *K. fluctuata*	Garden Carpet. D.	P.	,, 30	,, 21
10. *L. argiolus*	Holly Blue (B). D.	P.	,, 30	,, 26
10*a*.	Oak (f).		May 3	
10*b*.	Hawthorn (b).		,, 9	
11. *C. ferrugata*	Red Twin-spot Carpet. D.	P.	,, 13	,, 27
12. *D. luteolata*	Brimstone. D.	P.	,, 13	Aug. 10
13. *C. pamphilus*	Small Heath (B). D or M.	L.	,, 19	
14. *S. menthastri*	White Ermine.	P.	,, 20	
14*a*.	White Ox-eye (b).		,, 22	
15. *A. plagiata*	Treble Bar. D.	L.	,, 22	,, 13
16. *X. montanata*	Silver Ground Carpet.		,, 22	
17. *H. lupulinus*	Common Swift.	L.	,, 23	
18. *H. jacobaeae*	Cinnabar.	P.	,, 23	
19. *P. icarus*	Common Blue (B). D or M.	L.	,, 25	July 30
20. *H. dentina*	Shears.	P.	June 1	
21. *S. lubricipeda*	Buff Ermine.	P.	,, 2	
22. *H. trigrammica*	Treble Lines.	L.	,, 3	
22*a*.	Dog Rose (b).		,, 4	
23. *O. violata*	Large Skipper (B).	L.	,, 8	
24. *C. bilineata*	Yellow Shell.	L.	,, 9	
25. *H. strigilis*	Marbled Minor.	L.	,, 12	

		First dates (average).		
26. *K. jurtina*	Meadow Brown (B).	L.	June	13
27. *Z. filipendulae*	Six Spot Burnet.	L.	,,	18
28. *T. pronuba*	Large Yellow U'wing.	L.	,,	20
29. *K. monoglypha*	Dark Arches.	P.	,,	22
30. *P. chrysitis*	Burnished Brass.	L.	,,	22
31. *M. persicariae*	Dot.	P.	July	2
32. *A. grossulariata*	Magpie.	L.	,,	5
32*a*.	Harebell (b).		,,	5
33. *B. gemmaria*	Willow Beauty.	L.	,,	6
34. *L. lithargyria*	Clay.	L.	,,	6
35. *O. sambucaria*	Swallow-tailed.	L.	,,	8
36. *L. conigera*	Brown Line Bright Eye.	L ?.	,,	8
37. *B. perla*	Marbled Beauty.	L.	,,	9
38. *P. similis*.	Yellow Tail.	L.	,,	10
39. *A. urticae*	Small Tortoiseshell (B).	I.	,,	12
40. *C. trapezina*	Dunbar.	?.	,,	16
41. *D. limitata*	Shaded Broad Bar.	L.	,,	21
42. *N. io*	Peacock (B).	I.	Aug.	6
42*a*.	Devil's Bit Scabious (b).		,,	6
43. *D. antiopa*	Common Vapourer.	E.	,,	10
44. *N. xanthographa*	Square Spot Rustic.	L.	,,	12
45. *T. popularis*	Feathered Gothic.	E ?.	,,	28
46. *K. circellaris*	Brick.	E.	Sep.	20
47. *A. lychnidis*	Beaded Chestnut.	E.	,,	24
47*a*.	Ivy (b).		,,	26
48. *O. vaccinii*	Chestnut.	I.	,,	28
49. *M. oxyacanthae*.	Green Brindled Crescent.	E ?.	Oct.	3
50. *O. dilutata*	November Moth.	E.	,,	14

(B) Butterfly; D, Double Brooded; M, Multi-Brooded.
Winter State :—E, egg; L, larva; P, pupa; I, imago; (b) blossom; (f) foliation.

Wednesday, 6th March, 1935.

Dr. S. A. Neave, O.B.E., President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society :—George Edward Hyde, 20, Woodhouse Road, Doncaster; Lionel Gilbert Ollyett Woodhouse, The Surveyor General's Office, Colombo, Ceylon.

Obituary.

The death of Mr. J. D. Ward, elected a Fellow of the Society in 1919, was announced.

Papers.

The following papers were read :—

"Location of olfactory receptors in insects—review of experimental evidence," by J. MARSHALL.

"A contribution to the classification of the Coleopterous family Lucanidae," by G. J. ARROW.

"Supplementary notes on the structural characteristics of *Pyrgus freija* (Warren, 1924) (Lep. Hesperiidae)," by B. C. S. WARREN.

Gift to the Society of rare printed works and manuscripts of Jacob Hübner.

The PRESIDENT said that he had great pleasure in announcing that, thanks to the munificence of Mr. R. W. LLOYD, the Society had just acquired a unique collection of the works, both printed and in manuscript, of Jacob Hübner, as well as many original drawings. He asked the Treasurer, who was an acknowledged expert on Hübner's work, to describe some of the more interesting items to the meeting, and proposed a very sincere vote of thanks to Mr. Lloyd for this further evidence of his extraordinary generosity towards the Society, and this was agreed unanimously.

Mr. Hemming then said :—

"The present collection of Hübner's works and manuscripts is of exceptional importance. The Society now possesses a copy of every entomological work published by Hübner except the *Lepidopterologische Zuträge* of 1820, and his catalogue of the Franck collection, copies of which are, however, available for study in the Department of Entomology at the British Museum (Natural History). The principal items now acquired are as follows :—

1. *Abbildungen und Beschreibungen noch unbeschriebener und noch nicht abgebildeter Schmetterlinge.* 8vo. Augsburg, 1785. pp. 16. 3 pls. col.

There is certainly no other copy of this work in Great Britain, and, indeed, the present copy is believed to be unique.* For an account of this work see Sherborn, 1929, Ann. Mag. nat Hist. (10) **4** : 81.

2. *Beitrage zur Geschichte der Schmetterlinge.* 8vo. Augsburg, 1786–1790. 32 pls.

This is Hübner's own copy of this work and contains the original drawings for the 32 plates.

3. *Sammlung auserlesener Vogel und Schmetterlinge,* &c. 8vo. Augsburg, 1793. pp. 16.

The Society have now acquired the text but not the plates of this rare work, the only other copy of which in this country is in the library of the Zoological Museum, Tring.

4. *Sammlung europäischer Schmetterlinge.* 8vo. Augsburg, 1796–[1841].

Much of the text of this work is extremely rare, and the additional text which the Society have now received almost completes their copy of this work. Some of the text is in the original wrappers as issued.

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* Since the meeting, Dr. L. G. Higgins informs me that he has seen a second copy of this work, which is in the library of Freiherr von Rosen at Munich.

5. *Geschichte europäischer Schmetterlinge.* [1793]–[1842].

The present collection contains 468 of the original drawings for the plates of this work, which in all number 500. The very rare text of 32 pages is already in the Society's library.

6. *Sammlung exotischer Schmetterlinge.* 1805–[1838].

The Society have now obtained a few of the original drawings for this work, 2 out of the 6 published sheets of text, photostats of 3 other sheets, and 12 sheets of text of considerably later date which were never published. The manuscripts received contain also valuable information regarding the localities of the specimens figured by Hübner in this work.

7. *Tentamen determinationis, digestionis atque denominationis singularium stirpium Lepidopterorum, &c.* 8vo. Augsburg [1806].

The Society have now received not only a copy of this extremely rare work but also the original manuscript of it.

8. *Verzeichniss bekännter Schmetterlinge.* 8vo. Augsburg, 1816–[1826].

The present collection contains a portion of the original manuscript of this work.

9. *Zuträge zur Sammlung exotischer Schmetterlinge.* [1809], 1818–[1837].

Some of the original drawings of this work are included in the present collection.

10. *Lepidopterologische Zuträge.* 8vo. Augsburg, 1820. pp. 32.

Part of the original MSS. of this work is included in the present collection.

11. *Index exoticorum Lepidopterorum.* 4to. Augsburg, 1821. pp. 8.

Two copies of this pamphlet, one of them Hübner's own with some annotations, with the original MSS., are included.

12. *Systematische alphabetisches Verzeichniss.* 8vo. Augsburg, 1822. pp. 81.

The collection contains part of the original MSS. of this work.

13. *Catalogue des Lépidoptères de la collection de M. Franck.* 8vo. Strasbourg [1826].

Some of the MS. of this work has been received.

In addition to the above works all of which are enumerated by Hagen (1862, Bibl. ent. **1** : 387–389), the following printed works not noted by him are included in the present collection :—

14. *Verzeichniss europäischer Schmetterlinge.* 8vo. Augsburg, 1791.

Only this copy of the title page of this work is known. See Sherborn 1929, Ann. Mag. nat. Hist. (10) **4** : 81.

15. *Der Schmetterlinge Lepidoptera Linnei.* 8vo. [n.pl.] n.d. pp. 16.

Hübner's annotated copy of this work has been received. The only other known copy is in the British Museum (Natural History).

16. *Erste Zuträge zur Sammlung exotischer Schmetterlinge.* 4to. Augsburg, 1808. pp. 8.

This is the only known copy of this work outside Germany.

Finally, the collection now received contains two items of very great interest. Of these, the first are four original drawings of plates of butterflies and moths on which Hübner wrote " My first attempts—Jacob Hübner, 1784." The second of these is a small notebook containing notes by Geyer of the greatest importance regarding the dates of publication of the plates of the *Geschichte europäischer Schmetterlinge* and of the *Sammlung exotischer Schmetterlinge.*

Larvae of *Nacerda melanura* L. in piles of pitch pine. By Dr. K. G. Blair.

The larvae, which were sent for determination by the Curator of the Hancock Museum, Newcastle-on-Tyne, were found in piles of pitch pine belonging to the Newcastle and District Electric Lighting Company, sunk to a depth of about 5 ft. below surface level. The piles were driven in 1915 and encased in concrete and brickwork. The sender was of opinion that it was impossible for the insects to get at the piles owing to this casing, and suggested that the eggs or young larvae must have been in the wood when the piles were driven twenty years ago. One objection to this theory is that the beetle usually prefers water-soaked wood, especially that buried in the ground—it is particularly addicted to the groynes used for beach protection -and the timber when the piles were driven would not be in a condition suitable for oviposition by the beetle, whereas it would have been in such condition for the past few years, yet there was no sign of them in the unencased lower portion of the piles below about 7 ft. Another objection is that though certain Longicorn larvae living in dry, seasoned wood have been known to live even longer than this, yet there is no reason for supposing that such a prolonged life-cycle occurs in *Nacerda.*

Some ancient Beetles from Egypt and Mesopotamia. By Dr. K. G. Blair.

At our Meeting on 5th Dec. 1917, Dr. Gahan exhibited a specimen of *Calosoma rugosum* Deg., found in the stomach of a mummied Ibis the age of which was estimated at some 3,500 years. Though somewhat broken the condition of the chitin of this beetle was scarcely different from that of a modern specimen. *C. rugosum* occurs over practically the whole of Africa.

Recently two beetles were submitted by Mr. H. O. Myers from a Predynastic tomb at Armant, Upper Egypt, dating approximately from 3,500 B.C. These beetles were *Ocnera hispida* Forsk., a common desert species of North Africa and S.W. Asia to-day. Among the ornaments found in the tomb was a necklace of which each bead was the thorax of the Buprestid beetle *Steraspis squamosa* Klug, while on another the femora of apparently the same species of beetle were strung. The chitin of all these beetles was now very thin and frail, and the thoracic sutures were open so that the sternal portion was disconnected from the notum. The colour also was altered, the black of the *Ocnera* being decidedly brownish, while the brilliant green thorax of the *Steraspis* was black, tinted with purple in the hollows.

Very shortly after, a beetle was received from Dr. H. Frankfort, of the Oriental Institute, found in the bitumen floor of an Early Dynastic house dating from about 2,500 B.C., now being excavated at Tell Asmar, Mesopotamia. This specimen was in a very different condition, consisting of a bitumen cast of the inside of the hind-body of the beetle. So far as can be seen it would correspond to the internal surface of the hind-body of a modern specimen of the Tenebrionid *Scaurus macricollis* All., again a present-day inhabitant of the same region.

Beetle remains from a block of Peat on the Coast of East Anglia. By Dr. K. G. Blair.*

The fragments, originally reported as from the peaty layers of the Forest-bed Series exposed beneath the boulder-clays at the foot of the cliffs on the Suffolk coast, were found by Mr. Philip E. Rumbelow of Yarmouth, were later ascertained to have been found in a block of peat cast up on the shore at Caister. The following species have been identified: *Rhysodes sulcatus* F., *Pterostichus vernalis* Panz., *Pt. strenuus* Panz., *Agabus unguicularis* Thoms., *Ilybius guttiger* Gyll., *Aleochara* sp., *Olophrum piceum* Gyll., *Dryops griseus* Er., *Donacia simplex* F., *Plateumaris discolor* Panz., and a larva of *Corymbites pectinicornis* L., besides various unrecognised fragments. Of the above the most noteworthy is *Rhysodes sulcatus*, a species no longer found in Britain, its present distribution being southern Europe, from the Pyrenees to the Caucasus, extending northward through Hungary and Austria only to South Germany. The other species all now exist in Britain.

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* Communicated on behalf of Mr. Claude Morley.

The condition of the material is very similar to that of the "moorlog" of the Dogger Bank, and the species are of similar habit to those recorded from that deposit.* Mr. Rumbelow reports that this peat is from time to time thrown up in considerable quantities, but in a limited area extending to about half a mile of shore, thus suggesting that it is of quite local origin. Such a deposit, supposed to be contemporaneous with, if not in continuity with, that of the Dogger Bank, is known to occur off the coast in this vicinity.

Discovery by L. Glauert, of the mimetic resemblance borne by a female fly (MYDAIDAE : Diptera) to the paired sexes of an Aculeate model (THYNNIDAE : Hymenoptera), on a small W. Australian island. By Sir EDWARD POULTON.

In this most interesting and, as I believe, novel example of mimicry the small male Mydaid fly (*Miltinus musgravei* Mackerras) exhibits the black-and-yellow pattern with banded abdomen, characteristic of so many Aculeate models in Australia and other parts of the world. The much larger female Mydaid possesses a similar pattern, modified so that the posterior section of the abdomen—about a third of the insect's length—is brownish orange and black instead of yellow and black, thus suggesting the appearance of the banded male Thynnid (*Elidothynnus melleus* Westw.) *in copulâ* with its small brownish female. "The colour resemblance, which," as Mr. Glauert wrote, 3 December, 1934, "is still fairly close, was much more so when the insects were alive. I am under the impression that both forms are flying at about the same time, the models being far more abundant than the mimics." Both were observed and captured on "Rottnest, a small island about eight miles by three, and ten miles west of the mouth of the Swan River. I had seen the fly on the island before I was struck by the mimicry, but only occasionally specimens were noticed. On a subsequent occasion when engaged in making a representative collection of the Thynnids, particularly males and females together, I was astonished to find that one of my supposed Thynnid couples was a Mydaid fly. The wasps and the flies were on the flowers of *Melaleuca pubescens* Schau. (= *M. preissiana* Schau.), where they appeared to be feeding."

The orange tint which—combined with the black ground and replacing the yellow spots—brings about the resemblance to the female Thynnid, is produced by the spread and dorsal extension of a colouring present on the lateral and ventral surfaces of the abdominal segments in both sexes.

It will be observed that this mimetic resemblance is not to a stinging model, for the position of the paired female would prevent the use of this weapon. There are, however, reasons for concluding that males of Hymenoptera possess other qualities which render them suitable as models. A brief discussion of this subject was suggested by the capture, in a single sweep of the net, of 19 male bees belonging to 5 species of *Sphecodes*, together with a single Tachinid fly, *Ocyptera brevicornis* Lw., beautifully mimetic of the pattern common to the stingless models (1904, *Trans. ent. Soc. Lond.*, **1904** : 644–649).

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* H. Whitehead, 1920, *Essex Nat.*, 19 : 242–244.

The five specimens exhibited to the meeting were brought from Australia by my friend Miss L. E. Cheesman. The male and female model, *Elidothynnus melleus* Westw., determined by Mr. R. B. Benson, had been taken on Rottnest island by Mr. Glauert, 6 March, 1932, and the male and 2 female MYDAIDAE, *Miltinus musgravei* Mackerras, 5 March, 1934, " at a time when the Thynnids were also quite abundant."

The Mydaid fly was determined by Mr. Glauert as the species described by Mackerras in 1928, *Proc. linn. Soc. N.S.W.*, **53** : 539. In the above-mentioned letter, Mr. Glauert wrote :—" Dr. Mackerras was here a few weeks ago, I showed him the fly and he expressed the opinion that the identification was correct, although the type locality is Adelaide, about 1600 miles away."

Miss Aubertin, who has examined the specimens, considers that they are very similar to *M. concinnus* Macq., as determined by Maj. Austen.

In preparing this communication I have received much help from my friends Miss D. Aubertin, M.Sc. (Mrs. Dineley), Mr. R. B. Benson, M.A., and Dr. B. M. Hobby, D.Ph.

Mr. Glauert, Curator of the West Australian Museum, Perth, is much to be congratulated on his interesting and surprising discovery.

[I have received the following additional information sent by Mr. Glauert in a letter written 9 April, 1935.—E. B. P.]

" In reply to your letter of March 13th concerning the position assumed by the Thynnids when in union, the female was, in every case that I noticed, curved downwards with her thorax roughly parallel to the under-surface of the abdomen of the male, which she grasped with her legs. When united in this way the couple would fly from flower to flower, the male would often feed and at times I have seen the female let go of the abdomen of her partner and also investigate the flowers. The trees visited were *Melaleuca preissi* (*pubescens*). Whilst in this position, of course the female could not use her sting, but when the pair were captured they would rapidly disengage, and then she could use it to some purpose, as I experienced to my cost. The effect was painful and lasted for some time, perhaps a quarter of an hour or more, but on this I am rather hazy, as I generally attempted to direct my attention to further collecting and not concentrate upon the pain.

" As regards the *Miltinus*, a curious feature which I think I mentioned in one of my letters was to the effect that the fly generally, if not always, for I am not quite certain of this, carried the tip of the abdomen bent downwards, a peculiarity which made the resemblance to the wasp all the more striking.—L. Glauert."

" Myasis " of Flamboyant Acacia Tree. By T. A. M. NASH.

[Sir Edward Poulton communicated the following notes contained in a letter written by Mr. T. A. M. Nash, 30 June, 1934, from Gadau (*viâ* Jos), N. Nigeria, to Sir Guy Marshall.]

Since the rains broke some of the Flamboyant Acacia trees on the station have been streaming sap from minute crevices in the bark. Sap and bubbles of air can be seen exuding. Crystals, of what looks like sugar, form all round these spots which are infested with Dipterous larvae. The branches are spotted with Dipterous eggs, the moist parts are swarming with *Chrysomyia* adults and adults of other species, but quite 98% of a catch are *Chrysomyia* spp.* The larvae are clustered around the minute cracks from which the sap exudes, their anterior ends buried in the cracks.

I have never yet seen any larvae bigger than those sent. Enclosed is a twig, and between the two cuts made on the wood is a typical fissure which was swarming with larvae, but they fell off when the twig was put in spirit (70% alcohol). I presume that the most natural explanation is that these trees are ailing, and possibly some fungus disease has caused the loss of sap. This sap is exceedingly attractive, and adults come from all around to feed on it. The females oviposit and larvae hatch and appear to feed on the sap, although they never seem to attain any size, and possibly cannot complete their development on such food. Of course the explanation may be that the flies are attracted to these trees, oviposit, and the larvae bore into the soft bark and greatly increase the escape of sap; but I do not believe this for a moment, as some of the crevices are on branches 4″ in diameter with very hard bark. On many branches the leaves have died and become brown, and on some the bark has split very badly, but there is no loss of sap from these large openings. Parts of the trees look very healthy, despite small fissures with their sap full of air-bubbles and larvae, so that the withering of certain branches is I think merely a symptom of the general disease.

The whole subject is quite new to me.

A new form of *Acraea althoffi*, Dew. By Professor G. D. HALE CARPENTER.

Mr. T. H. E. Jackson, F.R.E.S., has given to the Hope Department of the Oxford University Museum a selection from a large collection made by him in the Budongo forest, 1934, from August 17th to September 6th. Previous investigations had shown that it was an unusually interesting locality (1933, *Proc. R. ent. Soc. Lond.*, **8** : 109) and I hope to communicate at an early date an account of the series of Acraeines and mimics collected by Mr. Jackson. Meanwhile the following description of a new form of *Acraea althoffi* is given.

***Acraea althoffi*, ♀ f. *budongensis*, form n.**

Resembles the form *telloides* Eltr. except that the pale subapical spots in areas 3, 4, 5, 6 of the fore-wing are white instead of tawny orange.

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* A part of a sample catch obtained by the author from one sweep of the net contained 7 *Chrysomyia putoria* Wied., 2 *Chrysomyza* sp., and 2 *Musca* sp., determined by Miss D. Aubertin and exhibited to the meeting. The *Chrysomyia* were rather smaller than the average size of this species in the British Museum series. Miss Aubertin (Mrs. Dineley) has reported on the larvae from the sap—"They appear to be 1st or 2nd instar *Chrysomyia* larvae, evidently attracted by the unhealthy sap, which is really quite unsuitable for them to breed in. (Analogous to attraction of blow-flies to foul-smelling flowers.)" It would be interesting to ascertain whether these larvae produce puparia yielding imagines, and if so to examine them for abnormality in size or in other respects.—E. B. P.

A close parallel is provided by a similar form of *Acraea jodutta dorotheae*, with white subapical patch, and an interesting feature of the collection made by Mr. Jackson is that these two forms bear considerable resemblance to the little-known *Planema schubotzi* Grunb., already reported from that locality (*loc. cit.*) and apparently not uncommon there. Further details of this association will be communicated when figures have been obtained: the following specimens were exhibited.

Acraea althoffi, ♂ 20; ♀ form (1) *drucei* Eltr., 5; (2) *althoffi* Dew., 17; (3) *telloides* Eltr., 8; (4) *ochreata* Eltr., 13; (5) transitional between the last two, 2; (6) *budongensis*, form n., 4; total 49.

The males show variation in three points. A. The pale spot on the fore-wing in area 3 may be all red, or may be powdered with yellow externally. In the former case an approach is made to the form *bitjana* B.-B. (1926 *Ann. Mag. nat. Hist.* (9), **17** : 384. B. The red patches on the fore-wing in the cell and area 2 may be separated by a black bar or may be continuous owing to absence of the distal end of the black bar. This latter, again, is an approach to *bitjana*. C. The pale triangles contained within the forked internervular rays at the margin of the hind-wing may be quite clearly shown above, or may only be visible beneath.

Female form 1 is like the males: the subapical pale area may be red or white. Female form 2, black and white, resembles *Acraea jodutta* female form *jodutta* F. There is variation especially in the depth of blackness of the broad marginal band to the hind-wing: one specimen having the inner two-thirds of the band so little black, and also the black at the base of the fore-wing so much reduced, that it is obviously the kind of variant from which has been developed the form *lycioides* described by the writer from the Sese Isles, L. Victoria (1932, *Proc.*, **6** : 64). Female form 3, tawny orange, resembles the female form *dorotheae* E. M. Sharpe of *A. jodutta*. The tawny-orange areas on the fore-wing vary in depth of colour and may be transitional to form (4). In some cases the subapical pale area is considerably paler, tending towards white. One such female was taken *in copulâ* with a male. Female form 4, pale yellow, resembles the *male A. jodutta*: transition from a very pale specimen to the white form is often seen.

It is of some interest to note that one of the specimens of female form *ochreata* bears very distinct imprints of a narrow beak of a bird on the fore-wings, clearly visible on both sides of the wing. Two attacks must have been made, in one case involving both fore-wings together, the other one wing only.

The male form of *althoffi* taken by Neave in the Daro forest in Western Uganda and named *neavei* by Poulton (1924, *Proc.*, **1924** : cxliv), with the red of the fore-wing and white of the hind-wing replaced by orange, was not taken by Jackson in the Budongo forest.

The above-named forms comprise all the known forms of *A. althoffi* except the rare *pseudepaea* Eltr., and *rubrofasciata* Auriv., which occurs in the Congo and Cameroons and is considered by Gaede to be a distinct species (1915, *Int. ent. Z.*, **9** : 111). This form has the band of the hind-wing red.

Finally a comparison may be made with the series from Entebbe described by Poulton (1911, 1^{er} *Congr. Int. Ent. Bruxelles*, 1910, **2** : 504–506) in which there were males 15, female forms *telloides* 8, *althoffi* 2, *ochreata* 1.

A variable series of *Sinna calospila* Walk., from Java with a description of three new forms. By Dr. Karl Jordan.

A series of 41 specimens of the Noctuid *Sinna calospila* Walk. (1865) collected by J. P. A. Kalis and A. M. R. Wegner in the mountains of East Java at altitudes varying from 4000 to 6000 ft. were exhibited. At first sight, the series suggests that it consists of several species; in fact, one of the colour-forms has been described by Hampson as *Sinna atrofusa* (cf. Hampson 1912, *Cat. Lep. Phal. Brit. Mus.*, **11** : 467). The occurrence of intermediates, the great individual variability of the forms of which there are a number of examples, and the identity of the genitalia leave no doubt that the specimens belong to one species only. The sexes differ in the hind-wing being buffish in the ♂ and white in the ♀, and some of the colour-varieties are evidently sex-limited, the exhibit consisting of the following forms :—

(1) Network of markings of fore-wing (above only) scarlet; both sexes.—f. *calospila* Walk.

(2) Network yellow; one ♂ only.—♂ f. **flava** form. n.

(3) Network drab brown; ♂♂ only.—♂ f. **fusca** form. n.

(4) Network red, interspaces black; both sexes.—f. *atrofusa* Hamps.

(5) Fore-wing white, markings absent or confined to apex and distal margin; ♀♀ only.—♀, f. **alba** form n.

The Continental subspecies was described by Elwes as *S. dohertyi* (1890).

Two African Agaristids. By Dr. Karl Jordan.

Two species of Agaristinae, a subfamily of Noctuidae, were also exhibited. Most of the species are gaily coloured and known to be day-fliers, some black and yellow Neotropical species, however, being on the wing at night. Judging from the bright colours of *Paida pulchra* Trimen (1863), which I obtained in Damaraland, one would have expected to find it in day-time at flowers; but the species came to the lamp, and when disturbed in day-time behaved exactly like a Noctuid, darting away and seeking quickly the shelter of tufts of herbage under low bushes. *Xanthospilopteryx pardalina* Walk. (1869), on the other hand, behaved like a butterfly. It was frequently observed in the hinterland of Porto Amboim in Angola below the steep escarpment, about 50 miles from the coast. It occurred at the road-side on flowering shrubs and at a distance of 10 yards looked, in the dazzling sunshine, like the black and yellow butterflies of the genera *Byblia* Hübn. (1818) and *Eurytela* Boisd. (1833) which were very much in evidence at the same place. The Agaristid, however, though very restless, revealed itself as a moth by its less fluttering flight.

Three uncommon European butterflies. By Dr. L. G. Higgins.

The following butterflies were exhibited with related forms for comparison.

1. *Agriades aquilo* (Bdv.) taken this year in Norway. The transition to *A. glandon* (de P.) which exists in the race *A. g. aquila* Gerh. (= *alboocellata* Gillm.) of Bavaria and N. Tirol is very interesting. The latter resembles *aquilo* very closely on the under surface, but the specific identity of the two forms is not yet established, as they diverge somewhat in the male genitalia and in the androconial scales.

2. *Melitaea athalia norvegica* Auriv. from the Dourefjeld. This very distinct and small form occurs on moors and is very similar to *M. athalia suessula* Fruhst. from the moors of Bavaria, specimens of which were also exhibited. The insect, which has received many names, was definitely associated with *athalia* by Wahlgren as long ago as 1912 (*Ent. Tidskr.*, 33 : 77). The genitalia as well as the general habitus, are somewhat atypical, and if it is really a form of *athalia* it is probably a well-defined subspecies.

3. *Erebia alberganus* (de P.) (= *ceto* Hb.). A specimen of the race *phorcys* Freyer was exhibited, taken in the Balkans in 1933, contrasted with typical *alberganus* and with the little *caradjae* of the Engadin. The very large *phorcys* was extremely scarce in this country, and he did not know of another specimen. It was described nearly a century ago, but only lately was its habitat in the Balkan Mountains certainly known. Its occurrence here, about 700 miles from the nearest Alpine locality, in quite a different mountain system, was very astonishing. Unfortunately he had to leave the locality before the main emergence, and obtained only one precocious specimen.

***Phylloxera* on vines, a new British record.** By G. Fox-Wilson.

The recent occurrence of *Phylloxera* in Berkshire is worthy of record for it indicates that the pest can survive under exceptional conditions in England.

During November 1934, the roots both of a pot Vine and of an established rod (var. " Black Alicante ") in a vinery were submitted to me from a private garden in Berkshire, with the statement that the roots were infected with Root-Knot eelworm, *Heterodera marioni* Goodey. A critical examination of the roots resulted in the discovery of the subterranean form (" *radicolae* ") of the Vine Louse, and of some free-living nematodes. Material was submitted to Mr. J. C. F. Fryer, M.A. (Ministry of Agriculture's Plant Pathological Laboratory, Harpenden), and to Dr. T. Goodey (Institute of Agricultural Parasitology, St. Albans) for their opinion; the former confirmed the presence of *Phylloxera*, the latter stated that there was no evidence of eelworm infection.

Some variation existed in the size of the individuals; the average measurements being :—length, 0·35 mm., breadth, 0·21 mm.

There are two types of root-galls, viz.—(I) small galls or nodules situated near the tips of the young rootlets; and (II) large swellings upon the older rootlets and roots. The former are more common and are less injurious to the plant.

A visit was paid to the garden on the 2nd January, 1935, and it was ascertained that the Vines " never had done well " over a long period of years, though new rods flourished for a year or so following planting-out in the borders—the effect of the presence of " *radicolae* " on the roots being comparable to that of root-pruning. Later, however, the strain of bearing a heavy crop with a diseased root condition resulted in a chlorotic condition of the foliage and reduced vigour. The infestation was more severe on pot plants than on established rods growing in the borders—this fact agrees with the theory that shallow roots are more susceptible to attack than deep roots. The leaf-form (" *gallicolae* ") has not been observed in these gardens, though mention is made of leaf-infestations in the earlier British records.

Without doubt the pest has persisted in these vineries for a considerable number of years, for new plants which were introduced to replace the unhealthy rods were obtained from a reliable firm in whose nurseries the pest has at no time existed.

It is unnecessary to outline the biology of *Phylloxera,* for the literature concerning it is extensive and is readily available (*vide* B. Grassi, 1915, *Month. Bull. agric. Intell. Pl. Dis., Rome,* **1915 :** 1269–1290).

The first record of *Phylloxera* in England was made by Westwood in 1863 (*Gardnrs Chron.*, 20th June, **1863 :** 584) from material collected at Hammersmith by the Rev. M. J. Berkeley. Westwood refers again to the outbreak in 1869 (*Gardnrs Chron.*, 30th January and 26th June, **1869 :** 109, 687), when he gave the insect the name of *Peritymbia vitisana.* It would appear that the presence of *Phylloxera* in England antedated its discovery on the Continent by nearly two years.

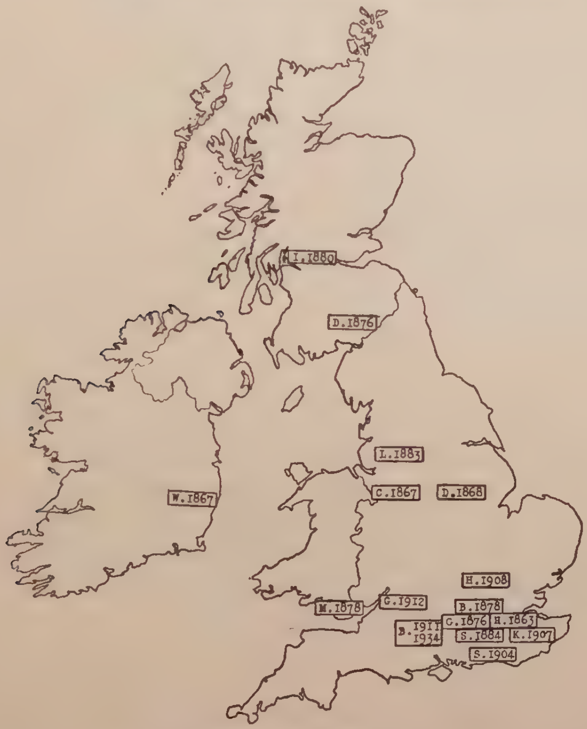
The last recorded outbreak is made by T. H. Middleton (1914, *Ann. Rept. Hortic. Br., Bd. Agric. Fish.*, **1912–1913 :** 48–49), and the following statement is made concerning it :—" The pest, though it can survive under exceptional conditions in England, spreads extremely slowly, never assumes epidemic proportions and takes many years to kill a plant, while many Vines in immediate contact are never affected. There is no reason for supposing that this pest can ever become a serious menace to English viticulture."

The accompanying map shows the distribution of *Phylloxera* in the British Isles so far as can be ascertained.

This pest is scheduled under " The Destructive Insects and Pests Order of 1922," and its presence must be reported to the Ministry of Agriculture, 10 Whitehall Place, London, S.W. 1.

My sincere thanks are due to Mr. F. Laing, M.A. (British Museum, Natural History) for supplying me with information regarding the generic name of the Vine *Phylloxera.* He states (*in litt.*) :—" Shimer published in 1866 two articles in the *Prairie Farmer*, for photostat copies of which I am indebted to Dr. Harold Morrison, U.S. Bureau of Entomology, namely on the 3rd November, p. 290, and 8th December, p. 365. In the former he refers to the ' Grape-leaf Louse,' called *Pemphigus vitifolia* [sic] by Fitch, and to another belonging to the same genus, occurring in galls on the Pignut Hickory to which he gives the specific name of *globosum.* He notes the resemblance of both to the genus *Phylloxera* Fonsc., as defined by Walsh but not by Westwood, and states that he has embodied his observations, creating a new genus and a new family, in a paper which has been offered for publication to the *Practical Entomologist.* In the second article on 8th December, headed ' Grape-leaf Louse—*Daktulosphaira vitifoliae,*' he records that Walsh refused to publish his paper in the *Practical Entomologist*, gives, amongst other notes, a generic description and states that ' I have included it under my genus *Daktulosphaira*, and by that name it may be known instead of *Pemphigus.*' In January of the following year, he read a paper, presumably the one rejected by Walsh, where he described the genus *Dactylosphaera* and, in a footnote, says that ' in case, however, the characters given above should be sufficient to separate, generically, *vitifoliae* from *D. globosum*, I would propose the generic name of *Viteus* for the former ' (1867, *Proc. Acad. nat. Sci. Philad.*, **1867 :** 2). The names *Daktulosphaira* and *Dactylosphaera* are derived from the same source; apparently what happened was that

Shimer had *globosum* and various other Phylloxerids classed together under the generic name of *Daktulosphaira*; that for the purpose of a semi-popular paper he issued an article on the Vine species in December under the name of *Daktulosphaira vitifoliae* and included a generic description, but when he came to give his paper to a scientific society a few weeks later he realised that his generic name was not correctly formed and substituted *Dactylosphaera*. He then found that the species he had included in this genus were not all congeneric, and restricted it to *globosum*, as type, erecting *Viteus* for *vitifoliae*. I suppose, however, that on account of his previous



LEGEND TO MAP.

H. 1863.	Hammersmith (first British record).
C. 1867.	Cheshire.
W. 1867.	Co. Wicklow.
D. 1868.	Derbyshire.
G. 1876.	Gunnersbury, Middlesex.
D. 1876.	Dumfries.
M. 1878.	Monmouthshire.
B. 1878.	Buckinghamshire.
I. 1880.	Inverness.
L. 1883.	Lancashire.
S. 1884.	Surrey.
S. 1904.	Sussex.
1905.	Dublin.
K. 1907.	Kent.
H. 1908.	Hertfordshire.
B. 1911.	Berkshire.
G. 1912.	Gloucestershire.
B. 1934.	Berkshire.

paper in the *Prairie Farmer* the genus *Viteus* becomes automatically a synonym of *Daktulosphaira*, though this, no doubt, is contrary to what Shimer intended, and those who do not regard the Vine species as belonging to *Phylloxera* have this generic name ready to take its place. There is sufficient difference in the spelling of *Daktulosphaira* and *Dactylosphaera* to allow both to stand, though really on the evidence it seems to me that the latter could be regarded as an emendation of the former; this course would make for further complication, however.

"Now, with regard to the specific name. A survey of the old literature shows that there was a good deal of controversy between Shimer, Walsh and Riley, and the latter especially, while admitting that *vitifoliae* was the earliest name and had priority over *vastatrix*, refused to recognise Fitch's name in his later writings. We, however, can ignore the polemics and restore the specific name of *vitifoliae*, as has indeed been done by more than one aphidologist. The name of the Vine Phylloxera, therefore, is *Daktulosphaira vitifoliae* (Fitch)."

Photographing insects in proportionate size. By C. Rippon.

Some years ago I got very dissatisfied with the slides generally available for illustrating lectures on the British Lepidoptera. There was no proper proportion in size between large and small insects; on the screen they appeared in some cases the same size and in others a very small insect was reproduced actually larger than a big one. Further, quite a number of photos were of set specimens and of larvae in unnatural conditions. Having done a good deal of photography in my younger days, I tried to find suitable apparatus for taking pictures of insects alive, in their natural surroundings, and of strictly proportionate size. About four or five years ago I at last found the camera I wanted, which was light and compact for field work and yet had all the necessary movements with double extension, requisite lens aperture, etc.

I have now about 400 slides in monochrome of the British Macrolepidoptera, which I am continually adding to as I find or obtain further species as larvae, pupae or perfect insects. All the photos are of living insects in their natural surroundings and characteristic positions, and are all in exact proportionate size.

After I had been at this work for some time I was tempted to try to do the same thing in actual colour photography. As colour work necessitates an exposure thirty times that for monochrome the difficulty of getting good results was largely increased, particularly of such subjects as butterflies with their wings spread; and in addition the latitude of exposure for colour is very much smaller than in monochrome. I found, however, that the results were well worth the extra trouble, while in some cases only a colour photo could show the apparent power of some larvae to assume different colouring to suit special surroundings.

The slides shown were selected from both the monochrome and colour series to illustrate the points mentioned.

Wednesday, March 20th, 1935.

Dr. S. A. Neave, O.B.E., President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society :—Mahmoud Effat, Beni-Swaif (Halabiyah), Egypt; Albert Reginald Daniel, Alwyn, Dove House Lane, Solihull, Near Birmingham; John Stainer, Endcliffe, Henbury, Near Bristol; George Loftus Windred, B.Sc., Colonial Sugar Refining Co., Lautoka, Fiji.

Obituary.

The death of Professor W. Benham, F.R.S., elected a Fellow of the Society in 1915, was announced.

Exhibits.

The following communications were made to the meeting :—

The white Arctiid Virginian Tiger-moth, *Diacrisia virginica* Fabr., refused by young Purple Martins. By Miss E. A. Oehlenschlaeger.

[Communicated by Sir Edward Poulton, who said that this interesting addition to the results described in our 1932, *Proceedings*, **7** : 98, 99, had been quoted from a letter, written 12 Febr., 1934, from Milwaukee, by Miss Oehlenschlaeger. *D. virginica* was given the acceptability rating of 71·4 by Dr. F. Morton Jones.*]

The Virginian Tiger-moth flies at night, and I thought several specimens would make a " good-night snack " for one of our 1934 Martins. It was refused : when I put it to my nose I did not blame the bird in the least !

Here is a white insect, going about its livelihood at night, very evilly odoriferous. Does not this denote a warning colour ?

The moths were named by Mr. T. E. B. Pope, Curator of insects, etc., in the Milwaukee Public Museum, who wrote : " the larva is the Yellow-bear of our gardens. The dense, long hair of some individuals is, however, white and of others reddish."

Notes on Japanese insects and their enemies. By Rev. E. G. Bucknill, M.A.

[Communicated by Sir Edward Poulton, who said that the observations were recorded in a letter written by his friend, 4 February, 1935, at Yokohama.]

There are three passages in the *Proceedings* for 29 December, 1934, which invite comment from a resident in Japan :—

p. 58. I think I have told you in a previous letter how, on releasing a bulky newly-emerged moth of the " Eggar " type in this garden, I saw a sparrow take it in mid-air, about 8 ft. from the ground, and carry it out of sight. The ubiquitous sparrow of Japan is the Tree-Sparrow of Gt. Britain.

p. 66 (6). I have seen a Mantis devouring the full-grown larva of *Papilio sarpedon* Linn., in this city : also even a frog in the hills near by.

p. 71. In my diary under Takayama (N. Japan), 20 July, 1934, I find this entry, " Saw dragonfly being eaten by web-spider and wasp or hornet simultaneously ! " This was of course in the (large) web of the former : I did not wait to see what happened when the two captors met ! In the Takayama neighbourhood there is one species of dragonfly—black and electric blue, length 2″—which is itself most bloodthirsty : one day, for instance, I saw it devour a smaller dragonfly, biting down into the thorax, the victim's head rolling off in the process.

On Aug. 26 of last year I picked up, near Mount Fuji, the four perfect wings of a fine *Danaus tytia* Gray, not a trace of any other part could be found.

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* 1932, *Trans. ent. Soc. Lond.*, **80** : 354, 381.

The Regulation of Moulting and "Metamorphosis" in *Rhodnius prolixus*.

By V. B. Wigglesworth.

During its five nymphal stages the morphological characters of *Rhodnius* change very little; but at the fifth moult when it becomes adult there are striking changes in all parts of the body. It is convenient to refer to the appearance of these adult characters as "metamorphosis." Thus, in the growth of *Rhodnius*, there are two phenomena to be considered: simple moulting, and moulting coupled with metamorphosis. Only one meal is necessary in each stage, the insect moulting at a definite interval after feeding. If the head is removed soon after feeding, the insect will not moult—although some of these headless individuals have remained alive more than a year. But there is a "critical period" (about 7 days after feeding in the fifth nymph, about 4 days in the earlier nymphs), after which moulting is no longer prevented by decapitation. The blood of insects decapitated soon after the critical period contains a moulting hormone which will induce moulting in insects decapitated twenty-four hours after feeding. There is some evidence that this hormone is secreted in the corpus allatum, the cells of which show signs of greatest activity during the critical period. The stimulus for the secretion of this hormone seems to be provided by the stretching of the abdomen by the meal, and this stimulus is conveyed to the head by the nerve cord.

The blood of fifth or final nymphs decapitated after the critical period will induce moulting coupled with metamorphosis in earlier nymphs decapitated soon after feeding. Even first-stage nymphs may be caused to turn into diminutive adults by this means. This is explained by supposing that all the nymphal stages produce the same moulting hormone (for instance, the blood of moulting fourth nymphs will induce moulting in fifth nymphs), but that the earlier nymphs, *i.e.* before the fifth nymph, produce in addition an inhibitory hormone which restrains metamorphosis. Thus, if blood from a moulting fourth nymph (not deprived of its head) is allowed to pass into a fifth nymph decapitated soon after feeding, the fifth nymph, instead of turning into an adult, develops into something like a "sixth nymph." The moulting hormone appears to be secreted before the inhibitory hormone; for if the early nymphal stages are decapitated around the critical period, a certain number of them suffer a precocious metamorphosis and develop into diminutive adults; while others show intermediate characters (prothetely)—due, perhaps, to the varying quantity of the inhibitory factor in the blood at the time of decapitation.

These results have been published in full in 1934, *Quart. J. micr. Sci.*, **77**: 191–222.

A new Syrphid larva and some other aquatic insect larvae which obtain their oxygen from plant roots.

By G. C. Varley.

The early stages of three species of insects were exhibited. They were found living in mud in the river Cam and they constitute a very remarkable case of convergence in their special respiratory adaptations. The larva of each species pierces the roots of the grass *Glyceria aquatica* Sm., by means of the spine-like hind spiracles and so obtains a supply of oxygen from the intercellular spaces of the plant.

The larva of the Syrphid fly *Chrysogaster hirtella* Loew has not been described * and an account of its structure and habits is being prepared for publication. As in many other Syrphid larvae the body terminates in a telescopic "tail," at the end of which are the hind spiracles; in this species the tail is quite short, and it terminates in a sclerotised needle-like point near the tip of which open the six narrow spiracular apertures. The larva has been discovered with the needle fixed in a root, though more usually the process of washing away the adherent mud dislodges it. The puparium has long horns formed by the prothoracic spiracles and is probably formed on land, since puparia of the same genus have been found in flood refuse.

The puparium of the Ephydrid fly *Notiphila riparia* Mg., is found attached to the roots by two spines on which the hind spiracles open, and in all probability the larva uses the spines in the same way.

The larva of the Chrysomelid beetle *Donacia semicuprea* is abundant amongst the roots of *Glyceria*, and as in *Notiphila* it is provided with two spines which enable it to pierce the roots and put the apertures of its hind spiracles in contact with the gas in the intercellular spaces of the plant.

Wednesday, April 3rd, 1935.

Dr. S. A. Neave, O.B.E., President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society:—Dr. Wilhelm Junk, Scheveningsche Weg, 74, The Hague, Holland; Professor Clarence E. Mickel, Ph.D., Division of Entomology and Economic Zoology, University of Minnesota, St. Paul, Minnesota, U.S.A.; Frederick George Michael Westropp, 80, St. George's Square, S.W. 1.

Obituary.

The death of Mr. G. H. Gurney, elected a Fellow of the Society in 1906, was announced.

A rare form of *Belenois thysa* Hopff. By Professor G. D. Hale Carpenter.

The late Dr. F. A. Dixey had apparently intended to exhibit the following specimens which were found on his working table in the Oxford Museum prepared for exhibition with a descriptive note dated 13 February, 1934.

The specimens are a male and female of an unusually dark form, the latter having been termed form *rimala* by Suffert, from Bugundi, at the south end of Lake Albert. The male has the marginal black much more pronounced than is usual, and a distinct row of submarginal black spots on the internervular rays of the hind-wing: these characters are more strongly marked than in any wet-season specimens in the Hope Department. The female has the greater part of the upper surface suffused with brownish-black, except for a whitish patch in the centre of the fore-wing, just covering the end of the cell and narrowing backwards to a small submarginal spot in area 1*b*. Even this whitish patch is heavily suffused with black scales along the veins. The dark scales covering the whole of the hind-wing on the upperside are besprinkled with yellow scales, which just in front of the cell are dense enough to form a yellow patch. The undersides do not differ much from normal, except in a more intense orange.

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* *C. viduata* is briefly described by Beling, 1888, *Verh. zool.-bot. Ges. Wien*, **38**: 3.

Both specimens were taken by myself in the Bwamba Valley, the part of the Semliki Valley at the foot of Mt. Ruwenzori which lies within Uganda, on 9 January, 1928. The only specimen in the National Collection was taken in the same locality by Dr. S. A. Neave: the form illustrates well the association of melanism with great humidity in the environment. An intermediate degree of melanism occurs in the form *obumbrata* Weym., which occurs in the neighbourhood of Ruwenzori and Lake Kivu, and is reported by Aurivillius (*in* Seitz) from Zanzibar.

All-female families of *Hypolimnas bolina* L. bred by Mr. H. W. Simmonds in Fiji.

By Professor G. D. HALE CARPENTER.

The following interesting family was exhibited, bred by Mr. H. W. Simmonds, F.R.E.S., from ova laid by a female captured on Rewa river, Viti Levu, Fiji, 8 August, 1934. The whole series had been presented to the Hope Department, Oxford University Museum, by the generous captor.

The parent, rather battered after captivity, is dark brownish-black with a small orange patch near the anal angle of the front wing in areas 2 (posterior part only), 1*b* and 1*a*, and a faint orange suffusion just beyond the cell in the hind-wing. This is a slight variation from Poulton's form "*euploeoides*," owing to the presence of the orange. The offspring fall into the following categories:

A. Like the parent, but with a tendency to develop blue on the faintly shown oblique patch on the fore-wing, and in the centre of the hind-wing, 5; B. With this blue clearly shown, 3; C. "*euploeoides*." With no orange, and a variable but slight amount of blue suffusion as in A, 10; D. Blue more developed, 2; E. Fore-wing oblique patch and central area of hind-wing entirely blue, 1; F. *naresi* Butl. with the fore-wing oblique bar white, and central patch of hind-wing suffused with blue around the edges, 10; G. As above, but with the orange appearing slightly developed in the anal area of the fore-wing, 2; H. *elliciana* Fruhst., like the last but orange well developed on the fore-wing, 8.

These 41 specimens may be divided into two groups:—

IA. Not male-like, of "*euploeoides*" form	20
B. Male-like, with white patches	20
Intermediate (specimen E)	1
	41

Or—

IIA. With the *nerina*-orange	16
,, ,, ,, very faintly shown	2
B. Without the orange	23
	41

The dates of emergence of the specimens are as follows :—

No.	Group.	Date.	No.	Group.	Date.	No.	Group.	Date.
1.	C.	7.ix.34	15.	F.	9.ix	29.	C.	11.ix
2.	G.	,,	16.	H.	,,	30.	,,	,,
3.	A.	8.ix	17.	A.	10.ix	31.	,,	,,
4.	F.	,,	18.	,,	,,	32.	F.	,,
5.	,,	,,	19.	,,	,,	33.	H.	,,
6.	,,	,,	20.	,,	,,	34.	C.	12.ix
7.	,,	,,	21.	C.	,,	35.	D.	,,
8.	G.	,,	22.	,,	,,	36.	F.	,,
9.	H.	,,	23.	F.	,,	37.	,,	,,
10.	,,	,,	24.	,,	,,	38.	H.	14.ix
11.	A.	9.ix	25.	H.	,,	39.	D.	15.ix
12.	,,	,,	26.	,,	,,	40.	C.	16.ix
13.	C.	,,	27.	,,	,,	41.	E.	17.ix
14.	C.	,,	28.	B.	11.ix			

As a convenience to those interested in this matter references to the previous communications to the *Proceedings* are brought together, commencing after Sir Edward Poulton's monographic paper on "Mimicry in the Butterflies of Fiji" (1923, *Trans. ent. Soc. Lond.*, **1923** : 564–691; *H. bolina* being considered on pp. 639–664).

Proc. ent. Soc. Lond., 1926, **1** : 29–31; 1927, **2** : 71–74; 1928, **3** : 18, 43–44; 1929, **4** : 75; 1930, **5** : 75–77.

The undesirability of establishing genera based on characters not common to both sexes and of the naming of subgenera. By G. J. Arrow.

The last paper I contributed to this Society was on the subject of Polymorphism in Beetles. I had not then studied the Stag-beetles, but I have since found that they are the most polymorphic beetles known to me. We are all familiar with the remarkable difference between the sexes of the common Stag-beetle. Even in the nineteenth century the great entomologist Marsham refused to believe that the male and female belonged to the same species and gave another name to the female. In many tropical forms the difference is still greater. A well-developed male and a female of the same species may differ in colour, pattern, shape and sculpture, and have entirely different head, legs, antennae, mandibles, maxillae, labrum and labium, in fact it may be impossible to find any single feature alike in both. But a series of males may also be all different, smaller specimens partly bridging the difference between female and large male.

Again there may be more than one form of large male, a long series showing divergence in two or more directions from the simple type represented by small specimens. All this makes the classification of the Lucanidae a very difficult matter.

One of the early attempts at a classification was due to Westwood, who, realising the difficulty of correctly associating the two sexes and the undesirability of founding genera upon features peculiar to one sex, referred most of the species to a single genus, *Lucanus*, but applied subgeneric names to a number of divisions distinguished chiefly by sexual characters. Later authors, finding these names ready to hand, have treated them as genera and formed many more similar genera for species unknown in Westwood's time. As a result, a female Stag-beetle, unless the male is known, cannot to-day be referred with certainty to any genus, and males of small development are in the same case. Many, nevertheless, have been described as new and generic names chosen at haphazard. The whole group is consequently in a state of confusion.

This state of things has led me, in the paper just accepted for publication by the Society, to suggest two propositions.

1st. That genera founded on features peculiar to one sex, where the other sex is not actually degenerate, are highly inconvenient and ought not to be adopted.

This seems to me so obvious that no argument is necessary.

2nd. That subgenera should not receive names similar to those of genera.

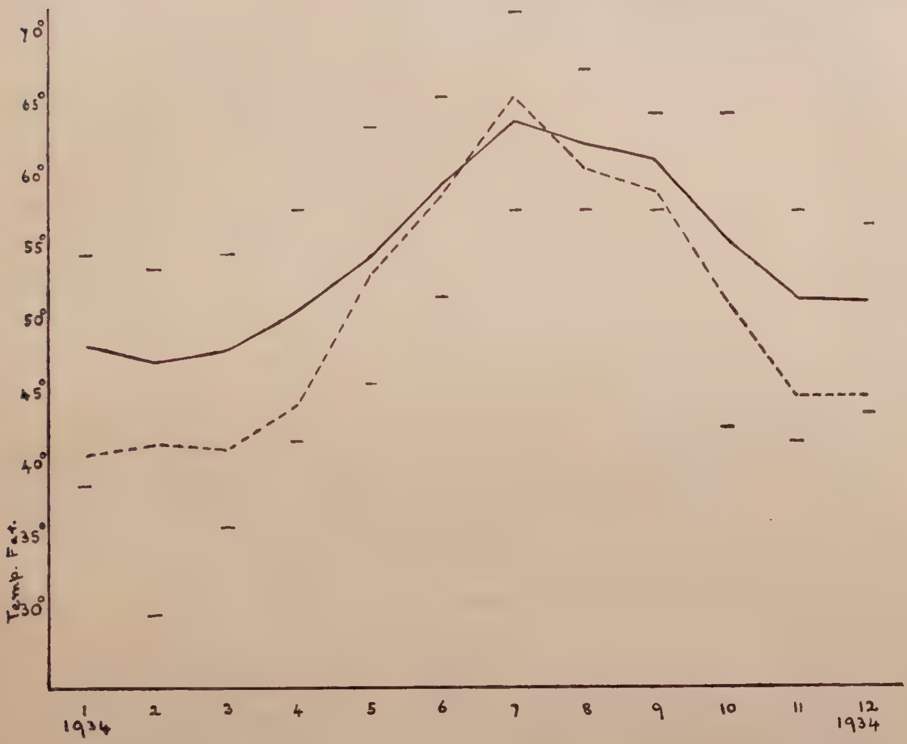
Such names are not admitted for groups superior to genera and there seems no better reason for giving them to inferior groups. Experience shows that such names merely cause difficulties. Some people will use them instead of the generic name, the same insect will be referred to sometimes by one name and sometimes by the other, those without special expert knowledge will suppose them to be different insects, misconceptions of distribution may result, statistics be falsified, and so on.

Another objection to the admission of such names is that they form an inducement to the unnecessary inflation of systematic literature. The invention of such names is the easiest of all ways of achieving immortality. It entails no laborious research, no exhaustive study of the world's literature. If we find a genus containing six species, three of them large and three small, we have only to say " I propose two new subgenera, Macrocarabus Jones, and Microcarabus Jones," and the name of Jones will be enshrined in the catalogues for ever. Another man will soon after find a species which is intermediate and cannot be referred to either, and the necessity for another subgenus Mesocarabus will seem obvious. So the game goes on. To speak of the grandis group and the parvus group would serve every purpose and form no obstacle to a later grouping on a different basis if found desirable. Subdivisions of large genera are of course very necessary, but names for them are not and, in my opinion, they are very objectionable.

The Bacteria Beds of Sewage Works as an Environment for Insects. By Ll. Lloyd.

The bacteria beds of sewage works form a curious environment for insects. Perhaps the nearest approach to them in nature is afforded by a pebble bed, or a moraine, in the spray of a waterfall. They stand like islands, many acres in extent, in the general countryside, and they have certain features which tend to segregate the species breeding in them from their free living congeners. Further, it would be difficult to find two sewage works in which conditions did not differ in at least one important feature. To those who believe that the environment has moulded and still moulds the species they should afford an interesting study. My observations are being made on the beds near Leeds.

The beds are usually six feet in depth and may be raised, or sunk in pits. Raised beds may be walled in, or open-sided. The medium may be pebble, broken stone, slag, clinker, coke or even small coal. The sewage when it reaches them has been freed from all but impalpable solids. It may have only domestic impurities, or its character may be determined by some local industry, as for example the wool washing of Bradford. Its character may be further modified by deliberate chemical treatment, acidified, for instance, or lightly chlorinated. It is distributed by revolving arms which traverse the beds at intervals of seconds only, or by travelling machines with intervals of perhaps forty minutes. It is the custom to rest a bed for four hours in twenty-four and to give longer rests periodically. One manager will give these rests on a steady routine while another will only rest a bed when it obviously needs it. The water falls on the bed either in jets or in a sheet, but in any case it becomes a gentle trickle amongst the medium. The bed surface may develop a characteristic leathery growth with the alga *Oscillatoria* as its basis, or it may be kept free from this by cautious chemical treatment. Under the combined action of sun and wind, and the activities of insects, worms and birds, this growth is continually fragmenting. The fragments are washed into the depths where they are held up by rubble, and there, together



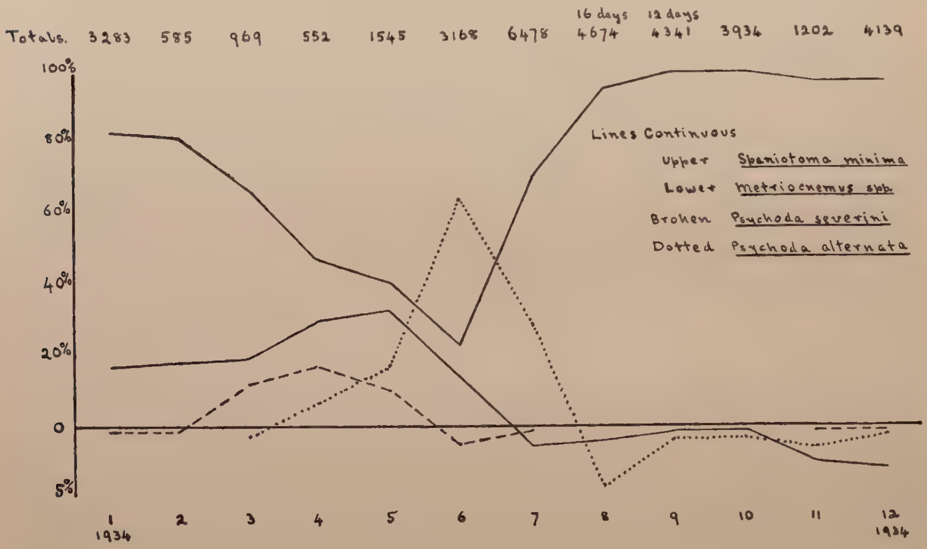
1

Diagram 1.—Mean monthly temperatures in Bacteria bed, 3 ft. deep, and range. Mean shade temperature shown by the broken line.

with a film of bacterial and fungal growth on the medium, and humus, form the staple diet of the insects. Any of the variations of treatment or design may influence the food supply.

The water impinging on the bed is devoid of dissolved oxygen, but on leaving it should be well oxygenated. The oxygen content, however, may not be an important factor in its direct influence as the larvae are not immersed in the water but only washed by it. The atmosphere of the bed is, of course, ordinarily saturated with moisture, and even a very long rest in fine weather does not dry out the bed except just near the surface.

Temperature records in the beds have been taken with maximum and minimum thermometers sunk in lidded pipes to 1 and 3 feet respectively. There proves to be no important difference in the temperatures at these depths. The monthly mean temperatures are considerably above the shade temperatures except in the height of summer, and the daily range is always much less. (Diagram 1.) Through the last two mild winters frost has been noted only once in the bed on an occasion when a strong keen wind was blowing. The equable temperature in the beds is probably due to the heat of vital processes. It is one of the segregating factors for the insect denizens as it must tend to give them a different season or, in some cases, a much more protracted season than the like species breeding naturally.



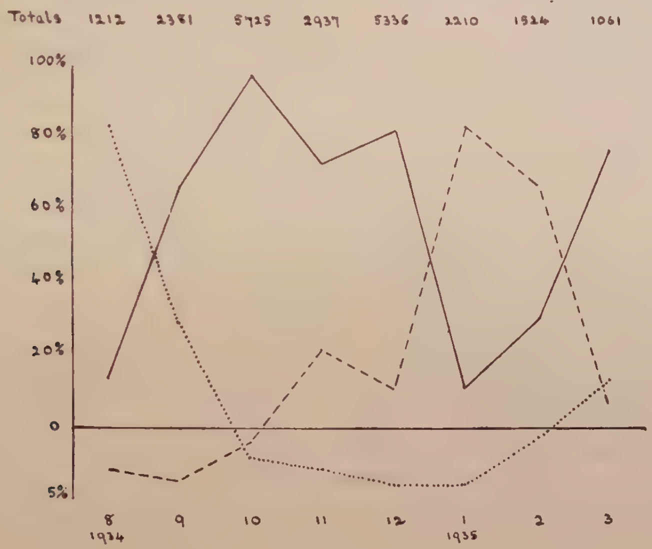
2

Diagram 2.—Knostrop A3. Analysis of insects trapped, dominant species. Jan.–Aug. 2 traps, Sept.–Dec. 1 trap.

Another segregating factor is given by the vast area and the depth of the habitable zone in the beds compared with the shallow zones available to the same species in nature. There is some slight zoning of the larvae in the bed, but one can say that the breeding-ground is almost as the cube compared to the square of a natural habitat. Therefore successful insects breeding in the beds emerge in numbers so vast that inbreeding must be the rule.

An almost unbroken record of the insect output has been kept at Knostrop, Leeds, on one bed for two years, and on another bed for one year; also on the Barnsley Sewage Works, 4 beds for 8 months. Shorter records have been made at Bradford, Huddersfield, Rodley and Shipley. I am much indebted to the Managers of these places for their ready help, especially to Mr. J. T. Thompson of Knostrop and Mr. H. D. Bell and his assistant Mr. C. Wildsmith of Barnsley, the latter having helped me with the laborious insect counts.

The insects are trapped by means of glass jars, cardboard lined and provided with paper cone inlets. The jar is placed over an opening in the face of a wooden tray, 1 ft. square and with sides an inch deep. The tray is let into the surface of the bed and any insect emerging below it, which on emergence seeks the light, should pass into the jar. As a rule the jars are changed twice weekly and the tray is scraped out and moved to a fresh position on the bed each week. The captured insects are killed with chloroform, spread over a large sheet of paper and counted under a reading glass. Anything difficult or unfamiliar is set aside for closer examination. Most of the species collected have been submitted to the Imperial Institute of Entomology.



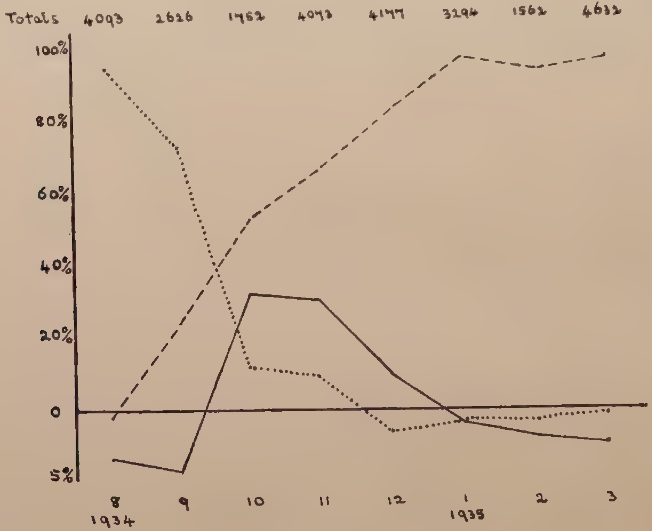
3

Diagram 3.—Barnsley bed III. Analysis of insects trapped, dominant species, continuous line *Spaniotoma minima*, broken line *Psychoda severini*, dotted line *P. alternata*.

The fauna is not rich in species. Over 200,000 insects have been surveyed and about 80 distinct species recognised, but of these 30 occurred only once, and only 2 to 5 individuals were taken of 20 other species. Any or all of these fifty may be stragglers on to the beds. Three species are generally abundant, *Spaniotoma minima* Mg. (Chironomidae), *Psychoda severini* Tonn., and *P. alternata* Say. *Spathiophora hydromyza* Fln. (Cordyluridae) is also general and seasonally abundant but not in comparable numbers. It is well known to be a predator among the active flies (J. W. H. Johnson, " A Contribution to the Biology of

Sewage Disposal," 1914, *J. econ. Biol.*, **9** : 105), and I have found its larvae feeding on the abundant Enchytraeid worms in the beds. Four insects are locally abundant, *Metriocnemus longitarsus* Goet., and *M. hirticollis* Staeg. (CHIRONOMIDAE), *P. compar* Eat., and *Achorutes viaticus* Tulb. The tube-making Chironomids are rarely trapped on the beds but some breed freely in the channels.

The following analysis will give an idea of relative abundance. At Knostrop among 96,000 insects, 81% *S. minima*, 10·7% *Metriocnemus* both species, 1% *P. severini*, 6·6% *P. alternata* ; ·3% other Diptera, ·3% Coleoptera, ·03% parasitic Hymenoptera, and ·01% Collembola. At Barnsley the analysis is different. Among 112,000, 50% *S. minima*, there is no *Metriocnemus*, 23·2% *P. severini*, 8·2% *P. alternata*, 18·1% *Achorutes viaticus*. The last named is introduced and cultivated.



4

DIAGRAM 4.—Barnsley bed II. Analysis of insects trapped, dominant species, continuous line *Spaniotoma minima*, broken line *Psychoda severini*, dotted line *P. alternata.*

(See W. H. Parkinson and H. D. Bell, " Insect Life in Sewage Filters," London, 1919.)

The analysis for a complete year of the more abundant species on one bed at Knostrop is shown in Diagram 2. The monthly percentages in the catches are given, the totals being shown at the top. *S. minima* is generally dominant and an output of 1000 per foot per day has been twice recorded. *Metriocnemus* are flies of late autumn and on into early summer, but a cold winter would divide their time of incidence. *P. severini* has similar periods of abundance. *P. alternata* is a midsummer fly but is rarely quite absent. Its curve of incidence is lower than it should be as the fly does not so readily enter the jars.

At Barnsley the systematic trapping starts in August when *P. alternata* is notably dominant. Diagram 3 shows the conditions on three of the beds examined. *S. minima* becomes dominant in September and remains so till December when *P. severini* replaces it. Diagram 4 shows the other bed where

S. minima made only a feeble showing in October and November, while *P. severini* was dominant from the time when the other *Psychoda* went out. The two beds are only a few yards apart and no theory is offered to explain the difference in fly output. The contrast in the charts shows that the rises and falls in numbers are not solely governed by season. *Achorutes* is ignored in these Barnsley analyses as its appearance in the traps is very erratic, dependent apparently on whether the tray is put near a colony.

The *Spaniotoma* yielded by the Barnsley beds this spring, and to some extent by the Knostrop beds, are larger than the series determined by Dr. Edwards as *S. minima*, but I can find no other difference and so have retained them under this name provisionally.

The charts show that one species or another is nearly always markedly dominant, the transitional periods being brief. The dominance is due in part at least to their temperature responses. At our summer temperatures *P. alternata* completes its life cycle in 16 to 20 days and at 85° does so in 7 days (G. M. Fair, "The Trickling Filter Fly," 1934, *Sewage Works J.*, **6** : 966–981; a recent review of the habits and control of *P. alternata*). *P. severini* in my experience never takes less than 20 days and its breeding is inhibited just over 75°, though our Yorkshire beds do not reach such a temperature. Bred in a warm room, T. 67°, in the same jars, broods of *P. alternata* beat *P. severini* by 12 clear days with female offspring slightly in excess, ratio 29 : 24 from 3 broods of each. *M. longitarsus* at moderate room temperatures requires 38 days or more, but one brood at a mean of 71° went through with the wide range of 19 to 34 days and larvae still remaining died off during the following 20 days apparently owing to the July heat. The larvae are very sluggish in hot weather. *Spaniotoma minima* requires about the same time as the *Metriocnemus* and has gone through its life cycle successfully at 71° in the laboratory. There may, however, be a heavy mortality among the Chironomids due to sun heat on the surface stones. Their oviposition is probably mainly near the surface and the pupae of *Metriocnemus* spp. are aggregated in the top 2 to 3 inches, though the larvae feed in the depths. A good deal of information is required before the varying dominance can be explained, not only as to temperature relationships but also as regards the attacks of one species on another when normal food becomes scarce. Larvae of *M. longitarsus* and *S. minima* are apt to eat out their own pupae in the laboratory, and on one occasion larvae of *P. alternata*, accidentally introduced with food into a culture of *P. severini*, destroyed all the latter.

THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

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Fellows whose Contributions for the current year have been paid are entitled to receive the Transactions and Proceedings of the Society free of charge. Further copies may be purchased at reduced prices by applying to the Secretary.

Forms of application for Fellowship, copies of the Bye-laws and the List of Fellows may be obtained from the Secretary.

MEETINGS AND EXHIBITIONS.

Intending exhibitors are required to send in their names and the nature of their exhibits to the Secretary *before noon* on the day of the meeting, in order that they may be called upon from the chair. Descriptive notes of all exhibits should be handed to the Secretary *at the same meeting* for printing in the Proceedings. If the epidiascope is required, 24 hours' notice must be given. Objects for projection should not exceed 6 ins. by 6 ins.

Fellows resident abroad, or who are otherwise unable to attend, are reminded that any specimens, notes~~, or~~ observations they may send to the Secretary will be considered by the Council, with a view to exhibition or reading at the meetings of the Society.

PAPERS AND ILLUSTRATIONS.

Fellows desiring to communicate papers to the Society must send the manuscript of such papers to the Secretary, 41, Queen's Gate, London, S.W. 7, at least fourteen days prior to the date of the meeting at which it is proposed that such papers shall be read. Authors desiring their papers to be published in the Transactions must submit the manuscript, and proposals for illustrations, if any, to the Secretary at least fourteen days before the meeting of the Publication Committee at which it is desired such papers should be considered.

Authors proposing to illustrate their papers should communicate with the Secretary before the drawings are executed. The size of the finished work on plates should be limited to 7½ ins. by 4¾ ins., after allowing for reduction, if any.

Attention is called to the Instructions to Authors issued with Part I of each volume, which may also be obtained at the Office of the Society. Inattention to these regulations may involve an author in considerable expense.

MEETINGS

TO BE HELD IN THE SOCIETY'S ROOMS

41, Queen's Gate, S.W. 7

1935.

Wednesday,	October	2
,,	,,	16
,,	November	6
,,	,,	20
,,	December	4

1936.

,,	January (Annual Meeting)	15
,,	February	5

The Chair will be taken at Eight o'clock.

THE LIBRARY

is open to Fellows, and their friends when accompanying them, daily from 10 a.m. to 6 p.m. (Saturdays, 10 a.m. to 1 p.m.). On the nights of meetings it remains open until 10 p.m. The Library is closed during September.

NOTICE

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